Audi 80 1992 ➢

Automatic gearbox 01N									
Gearbox ID	CLF	CLH	CLN	CLP					

Edition 08.2002

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List of Workshop Manual Repair GroupsList of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Audi 80 1992 ➢

Automatic gearbox 01N

Repair Group

00 - Technical data

32 - Torque converter

37 - Controls, Housing

38 - Gears, Hydraulic controls

39 - Final drive, Differential

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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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Contents

00 - Technical data 1
1 Identification of gearbox 1
1.1 Identification of gearbox 1
2 Code letters, gearbox allocation, ratios, equipment 2
2.1 Code letters, gearbox allocation, ratios, equipment 2
3 Capacities 3
3.1 Capacities 3
4 General repair instructions 4
4.1 General repair instructions 4

32 - Torque converter 7
1 Torque converter 7
1.1 Torque converter 7
1.2 Identification of torque converter 8
1.3 Draining torque converter 8
1.4 Fitting a new torque converter oil seal 9
1.5 Checking torque converter 10
1.6 Installing torque convertor 10

37 - Controls, Housing 12
1 Servicing shift mechanism 12
1.1 Servicing shift mechanism 12
1.2 Checking shiftmechanism 12
1.3 Dismantling and assembling shift mechanism 13
1.4 Removing, installing and adjusting selector lever cable 21
1.5 Removing, installing and adjusting locking cable 23
2 Checking gearbox 25
2.1 Checking gearbox 25
2.2 Performing self-diagnosis 25
2.3 Checking shift points 25
2.4 Checking stall speed 25
2.5 Fault finding table for "4-speed automatic gearbox" 25
3 Removing and installing gearbox 25
3.1 Removing and installing gearbox 25
3.2 Securing gearbox to repair stand 35
3.3 Removing and installing gearbox support 36
4 Checking and topping up ATF level 38
4.1 Checking and topping up ATF level 38
4.2 Checking ATF level 38
4.3 Changing ATF or filling up after repairs 42
5 Gearbox with selector elements 45
5.1 Gearbox with selector elements 45
5.2 Position of selector elements 46
6 Dismantling and assembling gearbox 47
6.1 Dismantling and assembling gearbox 47
6.2 Rules for cleanliness when working on the automatic gearbox 47
6.3 Removing and installing ATF pipes 47
6.4 4-cylinder petrol engine 48
6.5 6-cylinder engine 50
6.6 Diesel engine 52
6.7 Cleaning ATF pipes and ATF cooler 53
6.8 Dismantling and assembling planetary gearbox 54

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6.9 Dismantling planetary gearbox - overview 54
6.10 Dismantling planetary gearbox 59
6.11 Assembling planet carrier - overview 65
6.12 I - Installing planet carrier 66
6.13 II - Installing components from reverse gear brake -B1- up to circlip for -B2- supporting tube 68
6.14 III - Installing components from large sun gear up to reverse gear clutch -K2- 71
6.15 IV - Installing components from supporting tube for -B2- up to ATF pump 75
6.16 Planetary gearbox adjustments - overview 86
6.17 I - Adjusting planet carrier 87
6.18 II - Adjusting reverse gear brake -B1- - overview 93
6.19 III - Adjusting clutch play between -K1- and -K2- 98
6.20 IV - Adjusting 2nd and 4th gear brake -B2- 102

38 - Gears, Hydraulic controls 109

1 Dismantling and assembling ATF pump 109
1.1 Dismantling and assembling ATF pump 109
2 Dismantling and assembling free wheel with -B1- piston 113
2.1 Dismantling and assembling free wheel with -B1- piston 113
3 Dismantling and assembling 1st to 3rd gear clutch -K1- 116
3.1 Dismantling and assembling 1st to 3rd gear clutch -K1- 116
4 Dismantling and assembling reverse gear clutch -K2- 122
4.1 Dismantling and assembling reverse gear clutch -K2- 122
5 Dismantling and assembling 3rd and 4th gear clutch -K3- with turbine shaft 126
5.1 Dismantling and assembling 3rd and 4th gear clutch -K3- with turbine shaft 126
6 Removing and installing valve body 132
6.1 Removing and installing valve body 132
6.2 Removing and installing oil pan 139
6.3 Removing and installing ATF screen 140
6.4 Removing and installing valve body 141
6.5 Removing and installing conductor strip with 10-pin connector 143
7 Dismantling and assembling parking lock 144
7.1 Dismantling and assembling parking lock 144

39 - Final drive, Differential 154

1 Checking oil in final drive 154
1.1 Checking oil in final drive 154
2 Renewing flange shaft oil seals 154
2.1 Renewing flange shaft oil seals 154
2.2 Renewing left-hand flange shaft oil seal 154
2.3 Renewing right-hand drive flange oil seal 156
2.4 Removing and installing grooved ball bearing 158
3 Dismantling and assembling final drive 160
3.1 Dismantling and assembling final drive 160
3.2 Repair overview of final drive 160
3.3 Removing and installing input gear 161
3.4 Removing and installing drive pinion 167
3.5 Removing and installing differential 176
3.6 Dismantling and assembling differential 183
3.7 Removing and installing differential bevel gears 189
4 Adjusting final drive 191
4.1 Adjusting final drive 191
4.2 Overview of adjustments 192
4.3 Adjustment overview 194
4.4 Adjusting input gear 195

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5 Adjusting drive pinion and crown wheel 198
5.1 Adjusting drive pinion and crown wheel 198
5.2 Adjusting gear sets; identification markings 199
5.3 Recommended sequence for readjusting final drive set 200
5.4 Adjusting drive pinion 201
5.5 Adjusting crown wheel 209
5.6 Adjusting backlash 212

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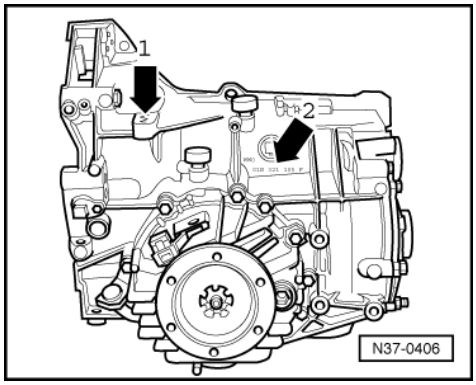
00 - Technical data

1 - Identification of gearbox

1.1 - Identification of gearbox

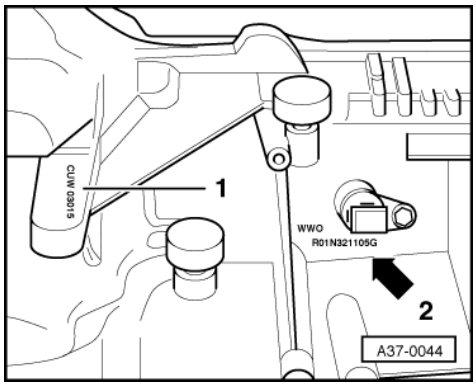


The 4-speed automatic gearbox 01N is installed in the Audi 80 1992 ä in combination with a 4-cylinder or 6-cylinder engine. Allocation=>Page 2 .

Location on gearbox

-> Code letters (arrow 1)

Automatic gearbox 01N (arrow 2)



-> Code letters and date of manufacture of gearbox

Example:	CUW	03	01	5
	Code letters	Day	Month	Year (1995) of manufacture

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Additional data depends on manufacture.

Note:

The gearbox code letters are also included on the vehicle data stickers.

2 - Code letters, gearbox allocation, ratios, equipment

2.1 - Code letters, gearbox allocation, ratios, equipment

Automatic gearbox			01N			
Gearbox	Code letters		CLF		CLH	
	Manufactured	from	01.95		01.95	
		to				
Torque converter	Code letters		LCDB		**LADB**	
Valve body	Code letters		**LCA**		**LCA**	
	Manufactured	from	01.95		01.95	
		to				
Number of plates			Inner	Outer	Inner	Outer
	Clutch -K1-		5	5	5	5
	Clutch -K2-		5	6	5	6
	Clutch -K3-		6	5	5	7
	Brake -B1-		5	5	5	5
	Brake -B2-		6	7	6	7
Allocation	Model		Audi 80 1992 ä		Audi 80 1992 ä	
	Engine		1.9 ltr. TDI - 66 kW		2.0 ltr. - 66 kW 2.0 ltr. - 85 kW	

Gearbox	Code letters		CLF	CLH
Ratios	1st gear		2.714	2.714
	2nd gear		1.441	1.441
	3rd gear		1.000	1.000
	4th gear		0.742	0.742
	Reverse gear		2.884	2.884
Intermediate drive	No. of teeth	Input gear	44	44
		Output gear	51	51
	Ratio		1.159	1.159
Final drive	No. of teeth	Drive pinion	11	9
		Crown wheel	35	38
	Ratio		3.182	4.222
Drive shaft	Flange dia. mm		130	130

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Automatic gearbox			01N			
Gearbox	Code letters		CLN		CLP	
	Manufactured	from	01.95		01.95	
		to				
Torque converter	Code letters		LCDB		**LADB**	
Valve body	Code letters		**LCA**		**LCA**	
	Manufactured	from	01.95		01.95	
		to				
No. of plates			Inner	Outer	Inner	Outer
	Clutch -K1-		5	5	5	5
	CLutch -K2-		5	6	5	6

Automatic gearbox		01N			
	Clutch -K3-	6	5	6	5
	Brake -B1-	5	5	6	6
	Brake -B2-	6	7	6	7
Allocation	Model	Audi 80 1992 ä		Audi 80 1992 ä	
	Engine	2.6 ltr. - 110 kW		2.8 ltr. - 128 kW	

Gearbox	Code letters		CLN	CLP
Ratios	1st gear		2.714	2.714
	2nd gear		1.441	1.441
	3rd gear		1.000	1.000
	4th gear		0.742	0.742
	Reverse gear		2.884	2.884
Intermediate drive	No. of teeth	Input gear	44	44
		Output gear	51	51
	Ratio		1.159	1.159
Final drive	No. of teeth	Drive pinion	10	11
		Crown wheel	37	38
	Ratio		3.700	3.455
Drive shaft	Flange dia. mm		130	130

3 - Capacities

3.1 - Capacities

Planetary gearbox

Capacities	Planetary gearbox	Automatic gearbox
Initial filling	5.5 ltr.	01N
Oil change	approx. 3.5 ltr.	
Lubricant	VW ATF G 052 162 ..	

VW ATF G 052 162 .. is transparent and yellowish. It is available as a replacement part in the following container sizes:

- 0.5 ltr. - Part No. G 052 162 A1
- 1.0 ltr. - Part No. G 052 162 A2

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Note:

Only the ATF available as a replacement part can be used in automatic gearbox 01N.

Checking ATF level and renewing ATF=>Page 38 .

Final drive

Capacities	Final drive	Automatic gearbox
Initial filling	1.0 ltr.	01N
Oil change	Filled for life No change	

Capacities	Final drive	Automatic gearbox
Lubricant	Gear oil SAE 75 W 90 G 052 145 (synthetic oil)	

Gear oil SAE 75 W 90 G 052 145 .. (synthetic oil) is available as a replacement part:

- 0.5 ltr. - Part No. G 052 145 A1
- 1.0 ltr. - Part No. G 052 145 A2

Checking oil level in final drive=>Page 154 .

4 - General repair instructions

4.1 - General repair instructions

Notes:

- An exchange component which contains all the selector elements and the valve body is available for the automatic gearbox 01N.
- Select the exchange component according to the gearbox code letters=>from Page 2 .
- Installation instructions:

=> Special information; Transmission; No. 10

The maximum possible care and cleanliness and proper tools are essential to ensure satisfactory and successful gearbox repairs. The usual basic safety precautions also, naturally apply when carrying out vehicle repairs.

A number of generally applicable instructions for individual repair operations, which are otherwise mentioned at various points in the Workshop Manual, are summarized here. They apply to this Workshop Manual.

Special tools

For a complete list of special tools used in this Workshop Manual

=> Booklet; Special tools, Workshop equipment

Gearbox

- Observe rules for cleanliness when working on the automatic gearbox=>Page 47 .
- Do not run the engine or tow the vehicle if the oil sump is removed or if the ATF has been drained from the gearbox.
- If the gearbox is removed from the vehicle, secure the torque converter to prevent it dropping out.
- Thoroughly clean all connections and the surrounding area before disconnecting.
- Before installing the gearbox, check the installed depth of the torque converter => Page 10 .
- When installing gearbox, ensure that the dowel sleeves are fitted correctly.
- Place removed parts on a clean surface and cover over. Use sheeting and paper. Do not use fluffing cloths!
- If repairs cannot be completed immediately and components are left open, cover the components carefully or fit plugs as required.

- Install only clean parts: do not remove replacement parts from their wrapping until you are ready to install them.
- When fitting a new automatic gearbox, check the following fluid levels and top up as required: ATF in planetary gearbox (=>Page 3 .

O-rings, seals, gaskets

- Always renew O-rings, seals and gaskets.
- After removing gaskets and seals, always inspect the contact surface on the housing or shaft for burrs resulting from removal or for other signs of damage.

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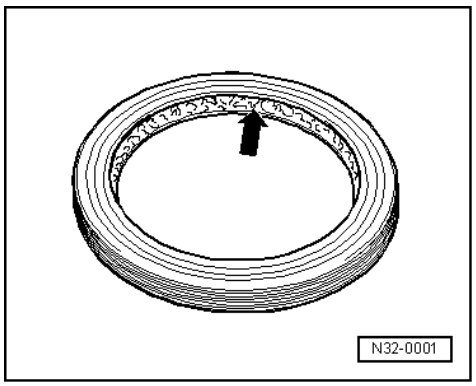
- Thoroughly clean housing joint surfaces before assembling.



- -> Before installing oil seals (radial shaft seals), pack space between sealing lips -arrow- with grease.
- The open side of the oil seals faces toward the side with fluid filling.
- Before installing, lightly lubricate outer circumference of seal and sealing lips with ATF or gear oil, depending on fitting location.

- Lightly lubricate O-rings with ATF before inserting to prevent them being trapped and damaged when assembling.
- Use only ATF in the parts of the gearbox where ATF is the specified lubricant; other lubricants will cause malfunctions in the gearbox hydraulics.
- When replacing oil seals, always vary the point at which the sealing lips make contact (use insertion depth tolerances).
- After installing, check fluid levels and top up as required: ATF in planetary gearbox (=>Page 3 .

Nuts, bolts

- Slacken the bolts in reverse sequence to the specified tightening sequence.
- Nuts and bolts which secure covers and housings should be slackened and tightened crosswise in stages if no tightening sequence is specified.
- Parts which are sensitive to distortion (e.g. valve body) must be kept straight when removing and installing; loosen or tighten diagonally in stages.

- The tightening torques stated apply to non-oiled nuts and bolts.
- Renew self-locking bolts and nuts.
- The threads of bolts which are secured by a locking fluid should be cleaned with a wire brush. Then apply AMV 185 101 A1 when inserting.
- Threaded holes into which self-locking bolts or bolts coated with locking fluid are screwed, must be cleaned (e.g. tap). Otherwise there is a danger of bolts shearing when subsequently being removed.

Locking elements

- Do not overstretch circlips.
- Always renew circlips which have been damaged or over-tensioned.
- Circlips must be properly seated in the base of the groove.

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Bearings

- Install needle bearings with the lettering on the bearing (the side with thicker metal) facing towards the drift or other tool used for installing.
- Lubricate bearings with gear oil or ATF, depending on fitting location. Lubricate particularly carefully before measuring friction torque.
- Do not interchange the outer and inner races of bearings of the same size.
- Always replace the taper roller bearings on one shaft together and use new bearings from a single manufacturer.
- Heat inner races of taper roller bearings to approx. 100 °C before installing. Press in onto stop when installing so there is no axial clearance.

Shims

- Use a micrometer to measure the shims at several points. Different tolerances make it possible to obtain the exact shim thickness required.
- Check for burrs and damage.

- Only install perfect, undamaged shims.

Inner plates

- Soak inner plates in ATF for 15 minutes before installing.

Valve body

- Renew the valve body if any of the selector elements are scorched.

Clutches

- Until further information is published, clutches K1, K2 and K3 should only be dismantled for cleaning; if parts are defective a new clutch should be fitted.
  Select the correct version according to the gearbox code letters.

Self-diagnosis

- Before performing repairs to the automatic gearbox, determine the cause of the fault as precisely as possible using the Self-diagnosis.

=> Automatic gearbox 01N, Self-diagnosis; Repair group 01; Performing self-diagnosis. Performing self-diagnosis.

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32 - Torque converter

1 - Torque converter

1.1 - Torque converter

Important
Before installing the gearbox, check the installed depth of the torque converter => Page 10 .

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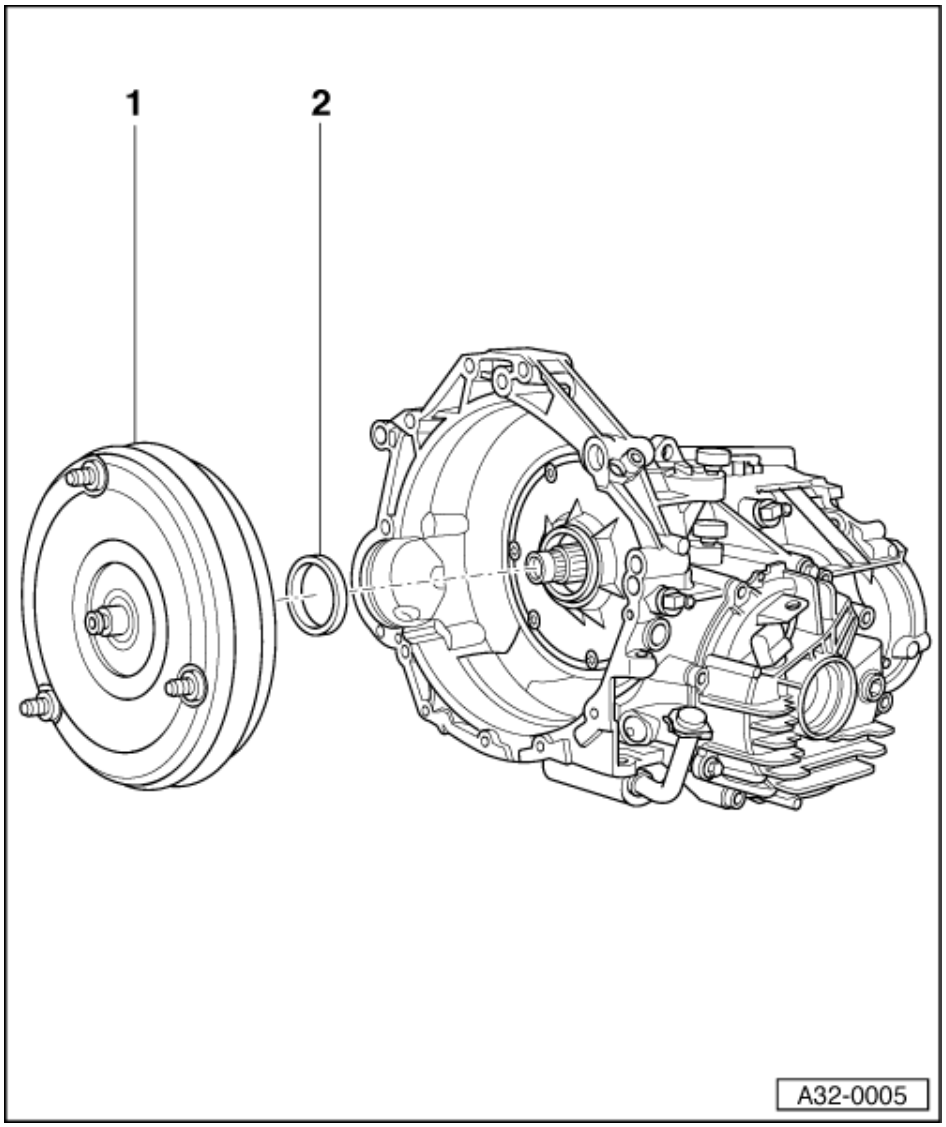
Notes:

- Observe rules for cleanliness when working on the automatic gearbox=>Page 47 .
- General repair instructions => Page 4 .
- Lubricate seals lightly with ATF. Other lubricants cause malfunctions in the gearbox hydraulics.



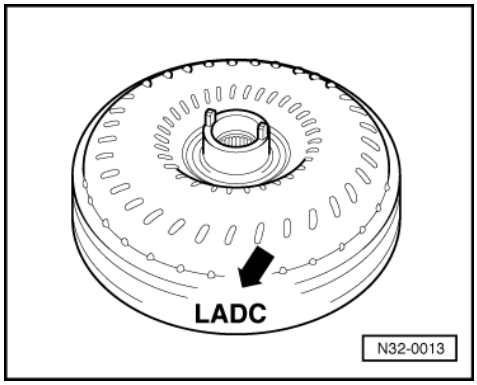
1 Torque converter
- Secure in place when gearbox is removed
- Code letters
  =>from Page 2

- Checking=>Page 10
- Installing => from Page 10
- Installed depth=>Page 10

2 Sealing ring

- Renewing => Page 9

1.2 - Identification of torque converter

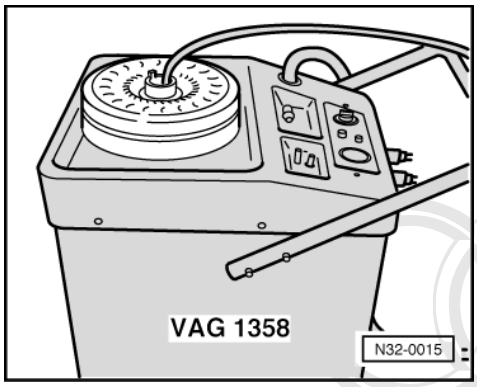


-> There are various torque converters. They are identified by code letters (arrow).

Gearbox/torque converter allocation =>from Page 2

1.3 - Draining torque converter

Special tools, testers and auxiliary items



- Oil extractor V.A.G 1358 A and probe 1358 A/1

If the torque converter has become fouled by abrasion or when performing a major overhaul of the gearbox, drain the torque converter as follows:

- -> Extract ATF from torque converter using V.A.G 1358 A and probe V.A.G 1358 A/1.

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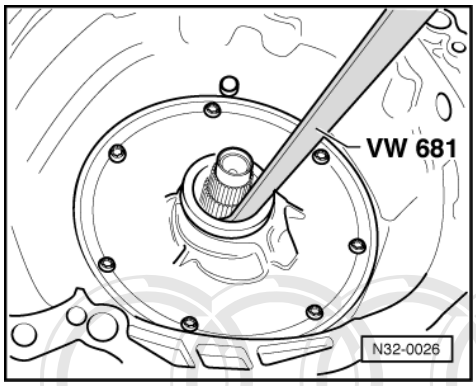
1.4 - Fitting a new torque converter oil seal

Special tools, testers and auxiliary items

- Extractor lever VW 681
- Drift sleeve 3158

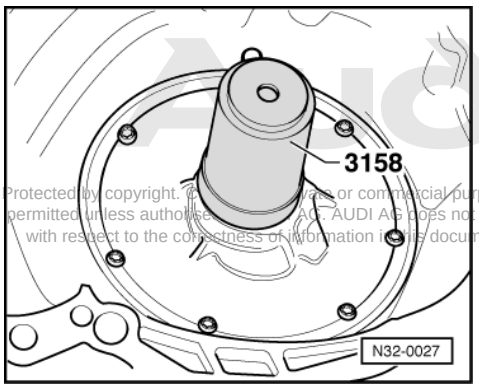
Removing

- Remove gearbox=>Page 25 .
- Remove torque converter.
- Secure gearbox to repair stand => Page 35 or place it on a level surface.



- -> Remove torque converter oil seal with oil seal extractor lever VW 681.

Installing



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- Lubricate the outer circumference and the sealing lips of the oil seal with ATF.
  - Installation position: open side of oil seal towards gearbox
- -> Drive in torque converter oil seal with drift sleeve3158until drift sleeve reaches stop.

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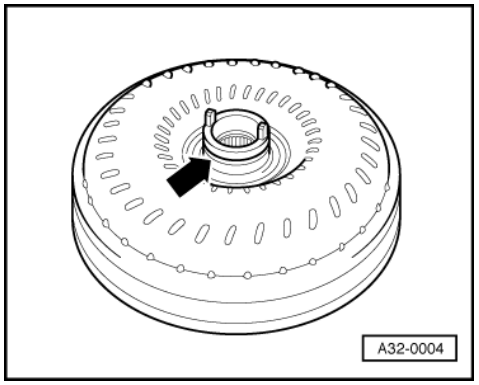
1.5 - Checking torque converter



- -> Check torque converter hub -arrow- for scoring.

Note:

The torque converter must be replaced as a complete unit if it is damaged or defective.

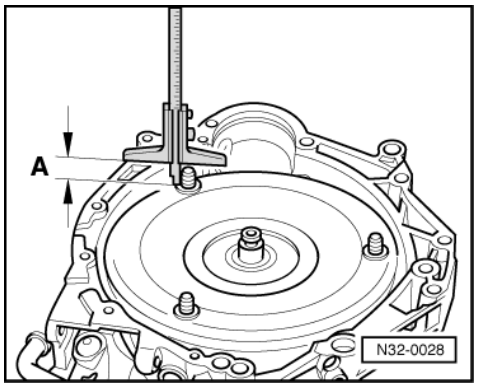
1.6 - Installing torque convertor

Special tools, testers and auxiliary items

- Depth gauge

- Press torque converter hub through oil seal as far as first stop.
- Lightly press torque converter inwards and turn until slots on torque converter hub engage in drive lugs on ATF pump gear and torque converter slides in a noticeable distance.

Installed depth



-> If the torque converter has been fitted correctly, the distance -A- between the gearbox housing flange and the contact surfaces at the base of the studs on the torque converter should be about 23 mm.

If the torque converter has not been installed properly, the distance will be about 13 mm.

Important!
If the torque converter is incorrectly inserted, the driver of the torque converter or the ATF pump will be severely damaged when the gearbox is attached to the engine.

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37 - Controls, Housing

1 - Servicing shift mechanism

1.1 - Servicing shift mechanism

1.2 - Checking shiftmechanism

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Selector lever in "P" position, ignition key inserted and ignition switched off.

- It should only be possible to remove the ignition key in this position.
- It should not be possible to move the selector lever out of "P" position when the ignition key has been withdrawn.

Selector lever in "P" position and ignition switched on:

- Brake pedal not depressed:

  Selector lever is locked and cannot be shifted out of "P" position. Solenoid for selector lever lock blocks selector lever.

- Brake pedal depressed:

  Solenoid for selector lever lock releases selector lever. It should be possible to engage a gear. Shift selector lever slowly from "P" position through "R", "N", "D", "3" and "2" and check whether the display on the dash panel insert shows the correct selector lever position in each case.

Selector lever in "N" position and ignition switched on:

- Brake pedal not depressed:

  Selector lever is locked and cannot be shifted out of "N" position. Solenoid for selector lever lock blocks selector lever.

- Brake pedal depressed:

  Solenoid for selector lever lock releases selector lever. It is possible to shift into a driving gear.

Notes:

- It should only be possible to shift the selector lever out of position "N" to position "R" with the lever pressed down and the brake pedal depressed.
- The starter must not operate in the selector lever positions "1", "2", "3", "D" and "R".
- On right-hand drive vehicles the starter must only operate in selector lever positions "P" and "N" when the locking button in the selector lever handle is not pressed.

- When travelling at speeds above 5 km/h and shifting into selector lever position "N", solenoid for selector lever lock must not engage and block selector lever. Selector lever can be shifted into a driving gear.
- When travelling at speeds below 5 km/h (almost stopped) and shifting into selector lever position "N", solenoid for selector lever lock must not engage until after approx. 1 sec. Selector lever cannot be shifted out of "N" position until brake pedal is depressed.

1.3 - Dismantling and assembling shift mechanism

Warning!
Before working on engine when it is running, move selector lever into position "P" and apply handbrake.

The following work is necessary before dismantling the shift mechanism:

- Remove centre console before working on selector housing (shift gate),solenoid for selector lever lock or locking cable

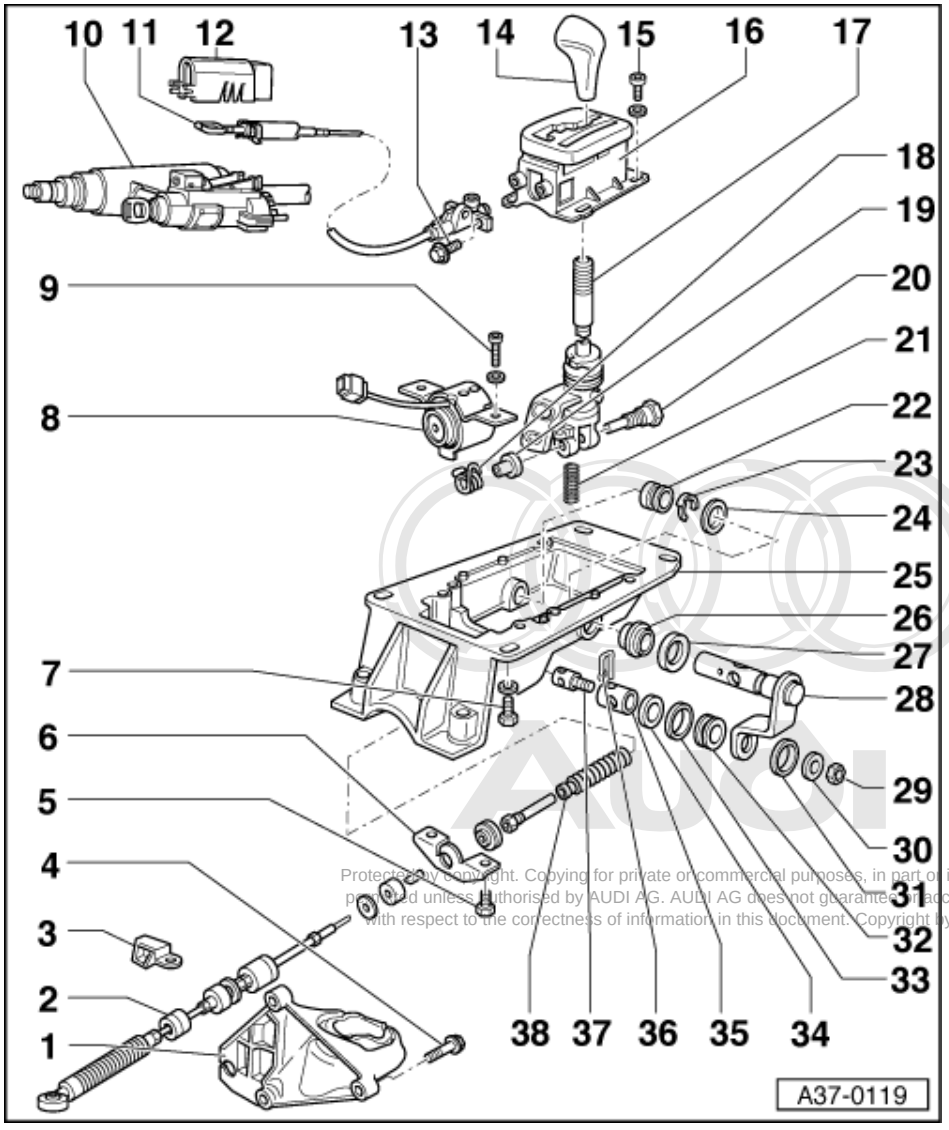
=> General body repairs; Repair group 70; Trim panels/insulation; Removing and installing front section of centre console Trim panels/insulation Removing and installing front section of centre console

- When replacing locking cable, also remove steering wheel and dash panel insert

=> Electrical system; Repair group 90; Gauges, Instruments, Radio; Removing and installing dash panel insert Gauges, Instruments, Radio Removing and installing dash panel insert

- Before the complete shift mechanism can be removed from below the vehicle, parts of the exhaust system must be removed and the heat shield must be unbolted.

=> Engine Mechanics; Repair group 26



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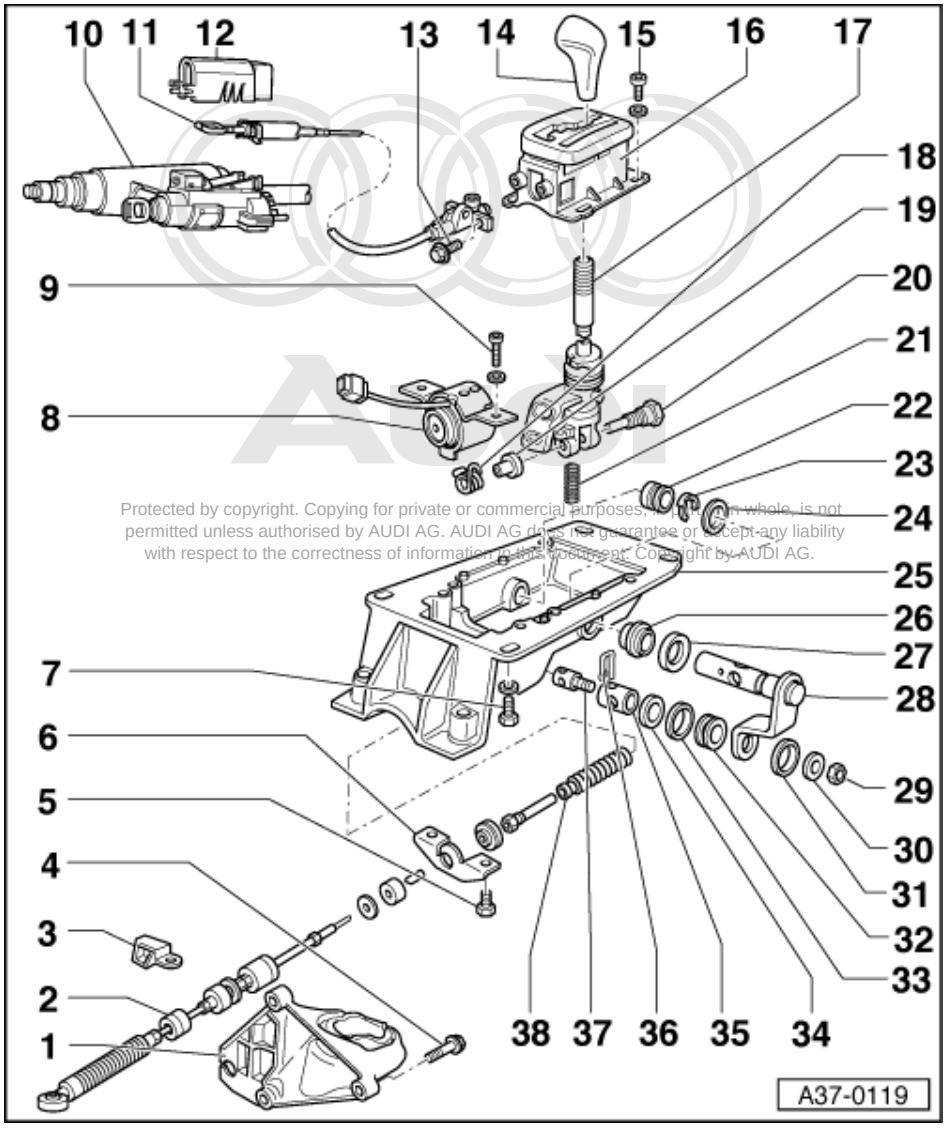
1 Gearbox support
- With attachment for selector lever cable
- Illustration shows rear gearbox support for 4-cylinder engine

2 Selector lever cable
- With guide and bush
- Ensure that bellows for selector lever cable is fitted correctly, otherwise water can enter selector lever cable assembly
- If front bellows is damaged, renew selector lever cable.
- Apply locking fluid AMV 185 101 A1 to bolts for cable attachments
- Tighten bolts on cable attachments to 12 Nm



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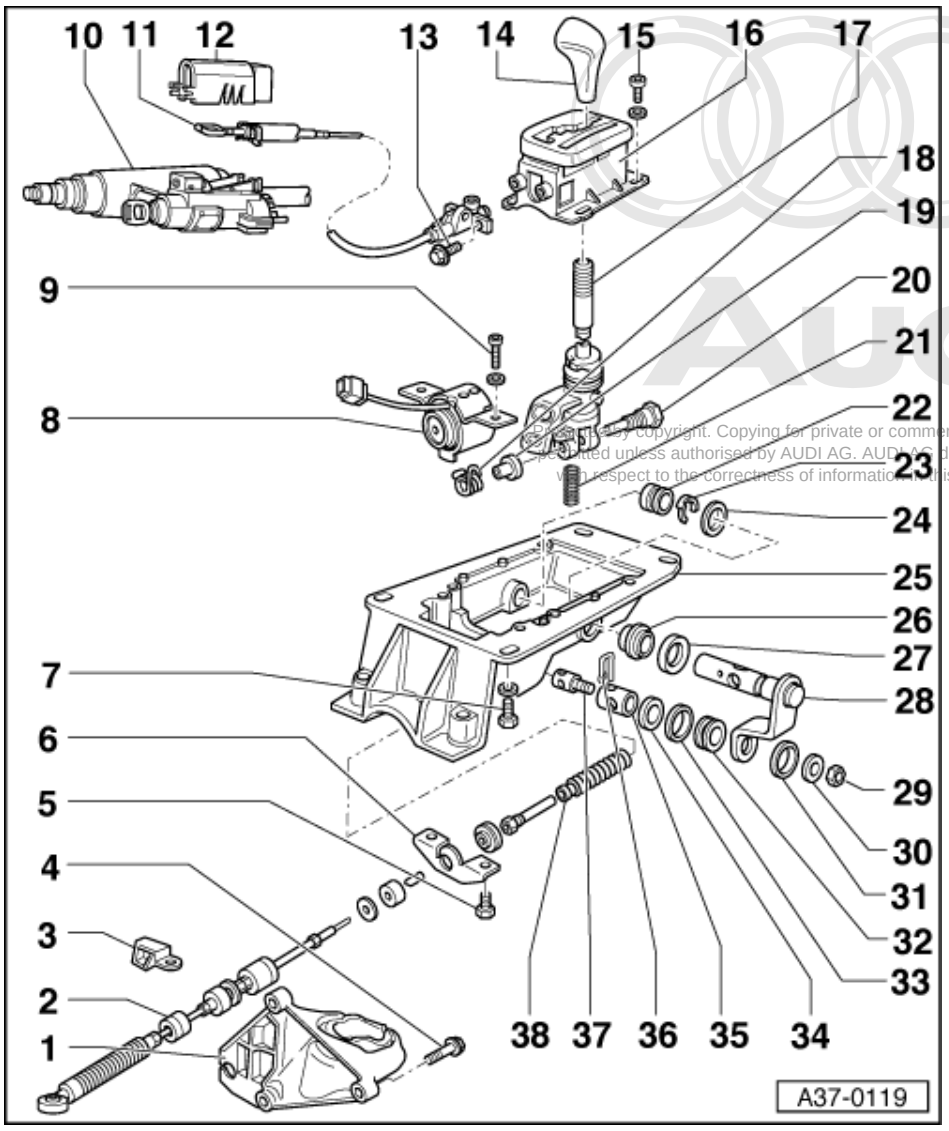
- Check that guide tube is properly secured
- Do not bend or kink, lightly grease cable eye and ball socket before installing
- Adjusting:

- Move selector lever into position "P".
- Slacken nut on clamp for selector lever cable.
- Move selector lever on gearbox into position "P" (move back as far as it will go)
- In this position, with selector cable free of tension, tighten nut -Item 29 - on clamping pin to 20 Nm

3 Retaining clip
- For ball socket
- Not fitted after about 06.95



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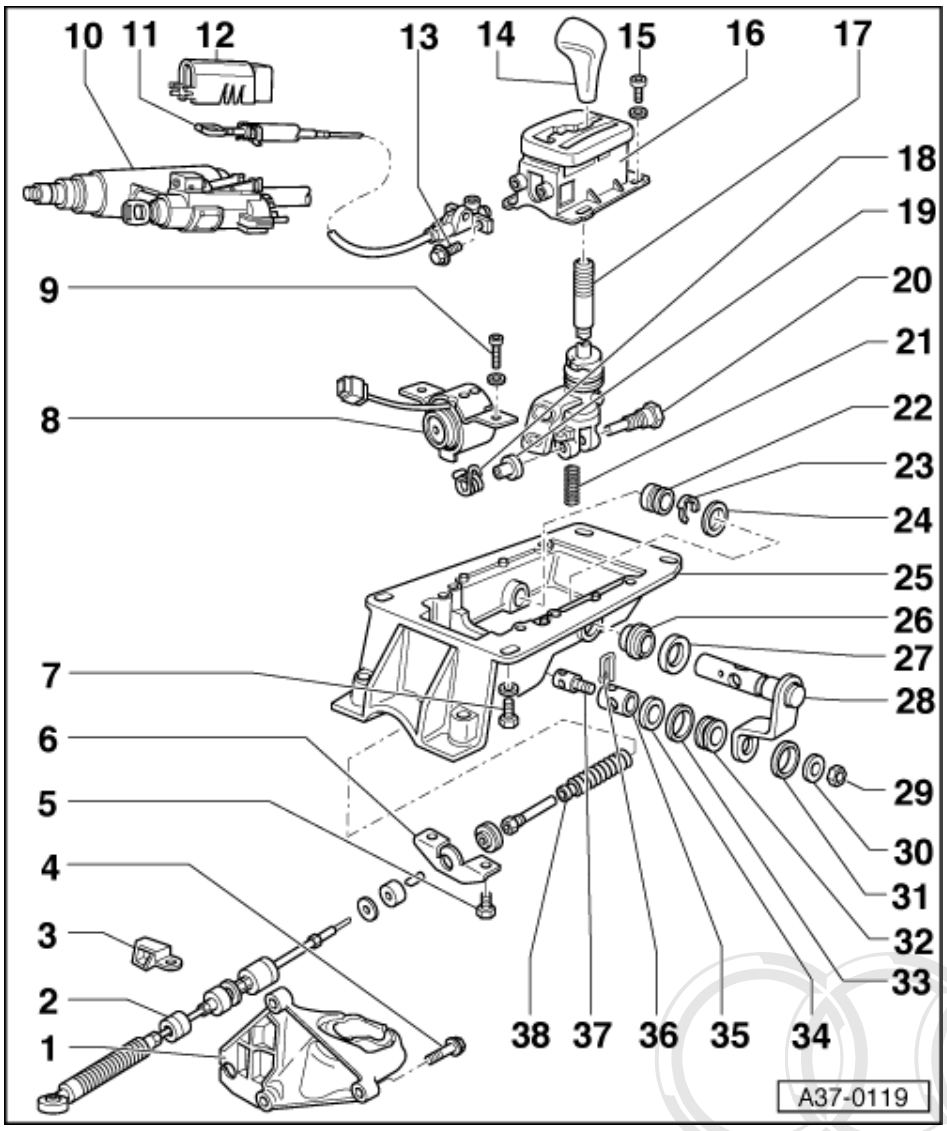
4 Bolt - 40 Nm
5 Bolt - 25 Nm
6 Bracket for selector lever cable
- Flanged side faces towards shift mechanism

7 Bolt - 10 Nm
8 Selector lever lock solenoid -N110
- Can be checked in electrical test and in measured value block

- Installing:

- Press solenoid with locking mechanism in axial direction against mounting bracket for shift mechanism, and tighten solenoid securing bolts



- After installing shift mechanism switch on ignition. The solenoid blocks the selector lever in position "P" and position "N". The selector lever can be moved out of positions "P" and "N" when the brake pedal is pressed
- Check clearance between selector lever and solenoid =>Fig. 21 .

9 Bolt - 10 Nm

10 Ignition/starter switch

11 Locking cable

- For ignition key removal lock
- Removing and installing =>Page 23
- Must not be kinked
- Adjusting=>Page 24

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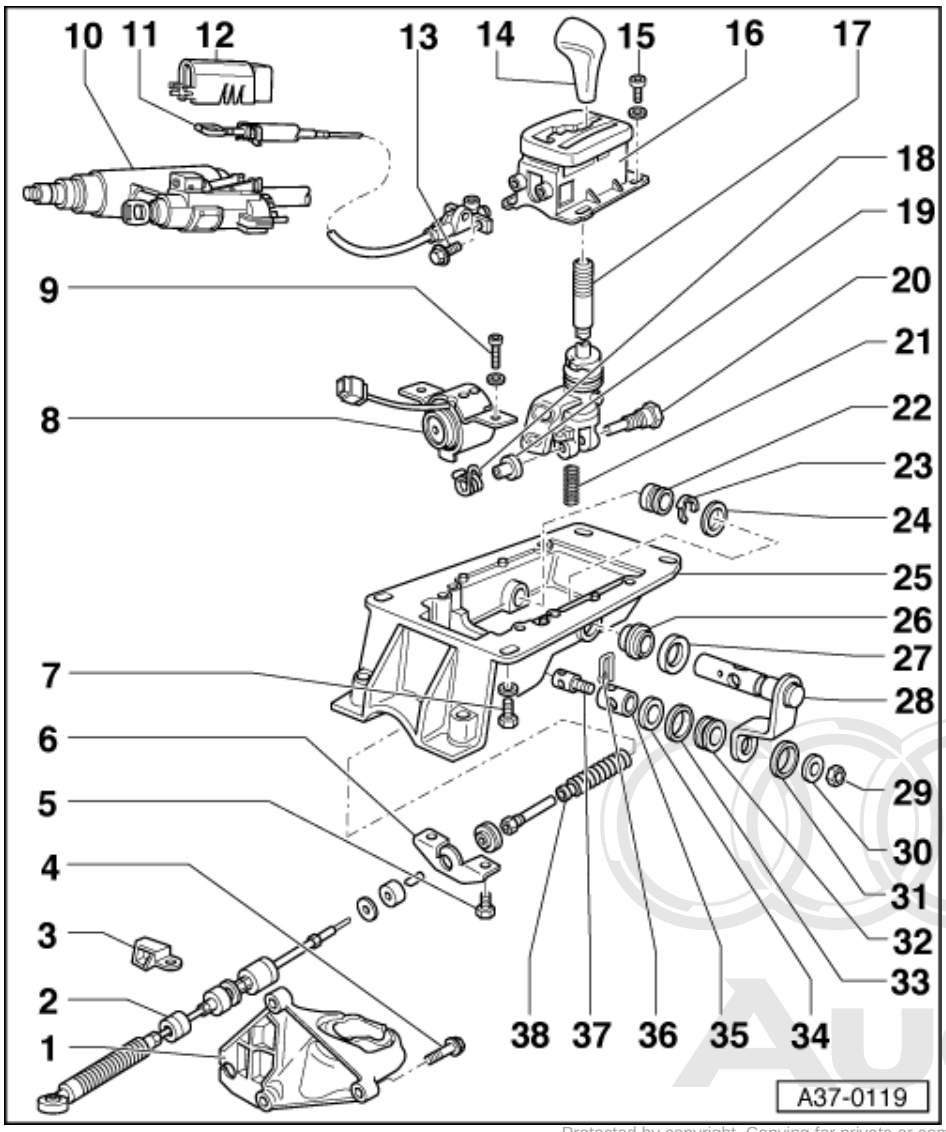

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12 Cover cap

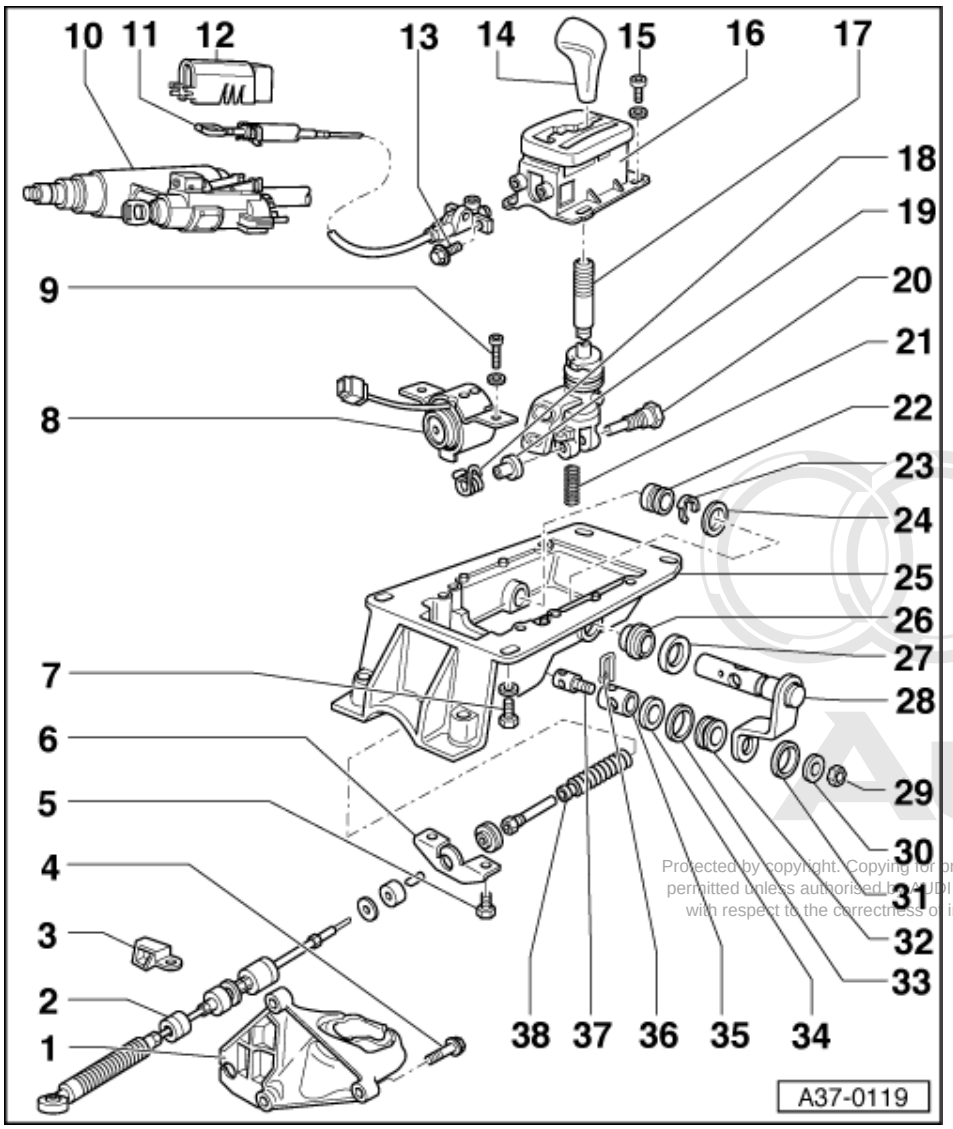
13 Bolt - 10 Nm

14 Selector lever handle

15 Bolt - 10 Nm

16 Selector housing (shift gate)

- Bellows and detent spring are integrated in selector housing
- Before removing selector housing, unbolt locking cable from selector housing
- Install selector housing after adjusting selector lever lock solenoid -N110
- Aligning
  =>Fig. 21



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17 Selector lever

- With clevis to lock selector lever in positions "P" and "N" and mechanism to release ignition key in position "P" via locking cable
- Checking clearance between selector lever and solenoid for selector lever -N110=>Fig. 21

18 Torsion spring

19 Bush

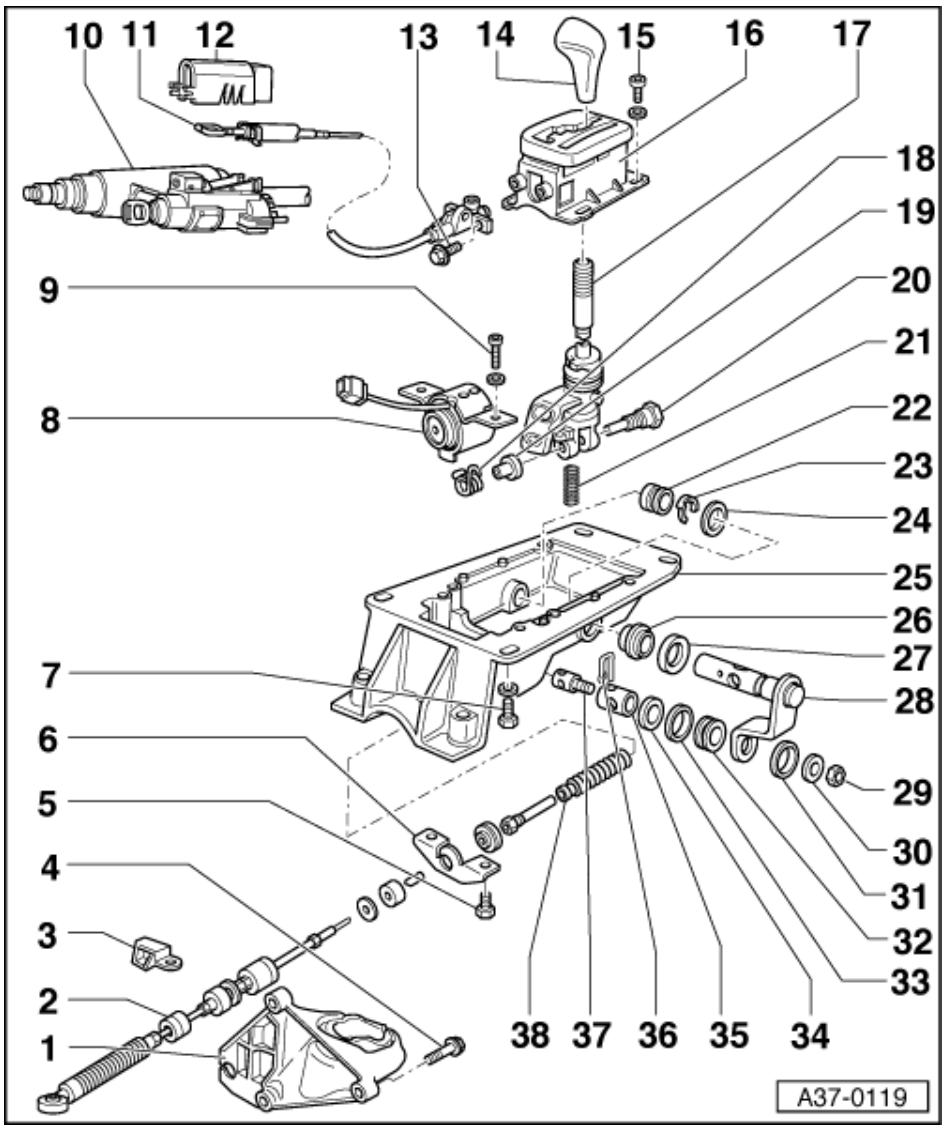
- For torsion spring -Item 18 -

20 Guide pin - 22 Nm

- Install after fitting compression spring --Item 21 -

21 Compression spring

- Insert into selector lever before installing guide pin -Item 20 -



22 Bush

- Grease with G 000 660 after installing

23 Circlip

- Install after fitting lever for shift mechanism -Item 28 -

24 Washer

25 Mounting bracket for shift mechanism

- Seal joint between mounting bracket and body using sealing compound AKD 512 000 05

26 Bush

- Grease with G 000 660 after installing

27 Sealing collar

28 Lever for shift mechanism

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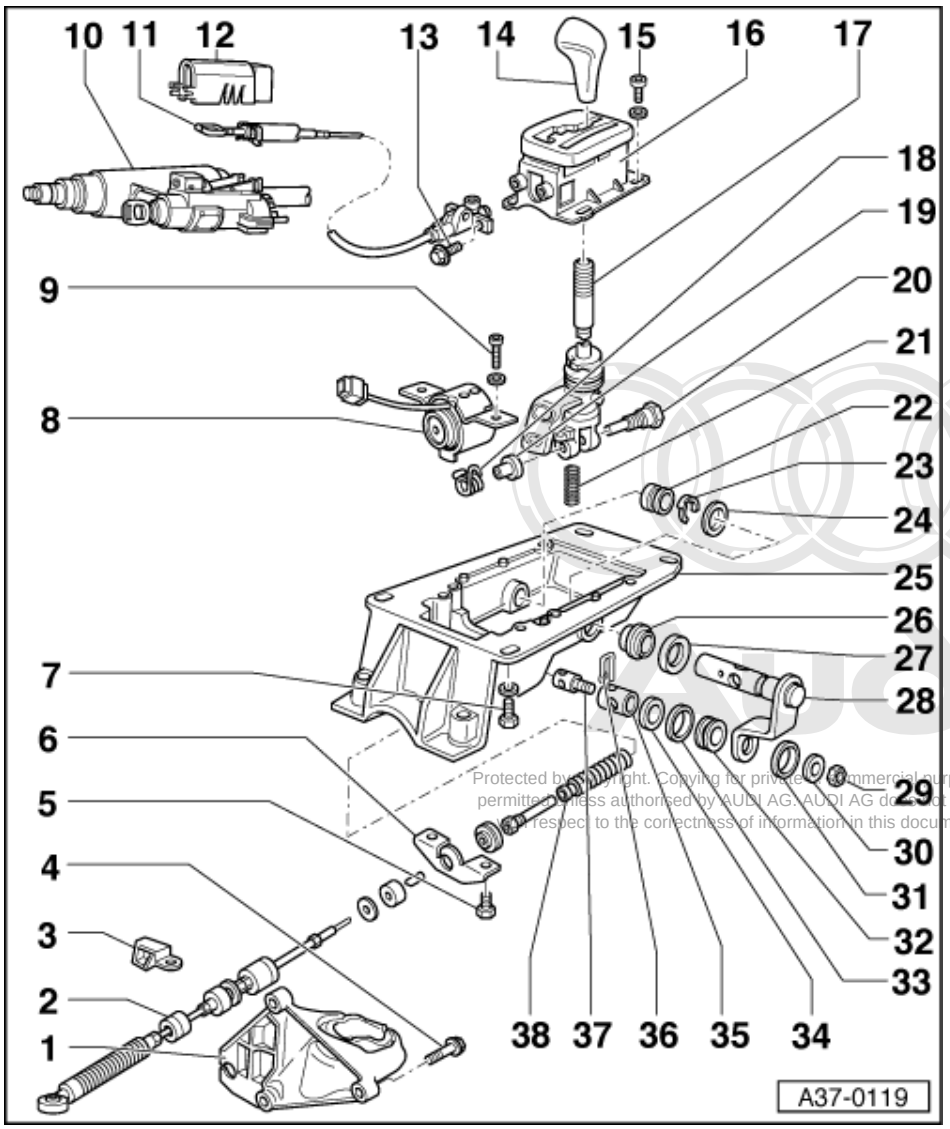

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29 Nut - 20 Nm

30 Washer

31 Sealing collar

32 Bush

- Insert into lever for shift mechanism -Item 28 -

33 Sealing collar

34 Washer

35 Sleeve

- For selector lever cable

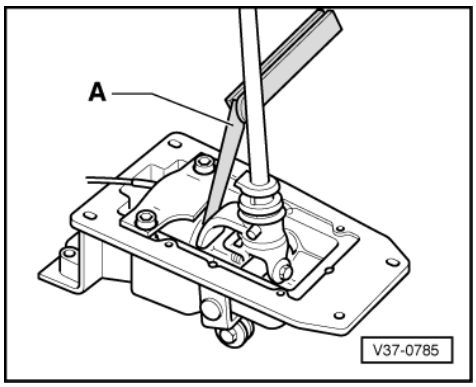
36 Spring clip

37 Clamping pin

- For selector lever cable

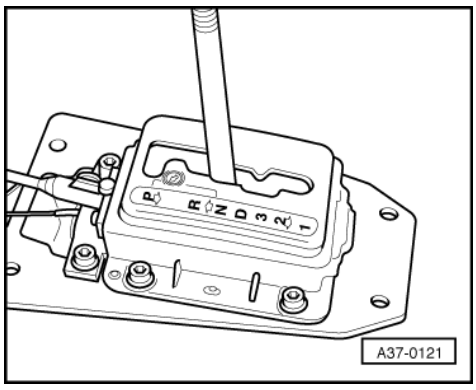
38 Boot

- Replace if damaged
- Check for proper seating



-> Fig.1 Checking clearance between selector lever and solenoid for selector lever -N110

- With selector lever in position "R", measure clearance between selector lever and selector lever lock solenoid using a feeler gauge -A-.
  - Specification: 0.6 ... 1.4 mm
- Adjust clearance if necessary bymoving solenoid in holes in mounting bracket.



-> Fig.2 Aligning selector housing with selector lever

- After installing selector lever lock solenoid, align bottom hole of clevis centrally with solenoid and energize solenoid.
- Fit selector housing (shift gate) in position. Selector lever should now be aligned with position "N" on selector housing.
- After tightening selector housing mountings, shift selector lever through all positions and check that it reaches end stops at "P" and "1".

1.4 - Removing, installing and adjusting selector lever cable

Note:

The selector lever cable must be adjusted after installation=>Page 22 .

Removing

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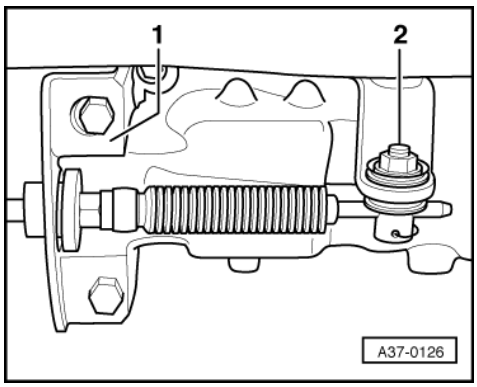
- Remove exhaust system heat shield below mounting bracket for shift mechanism.
- 6-cylinder engine: remove right gearbox support=>Page 36 .
- Slacken bolt for selector lever cable at gearbox support, release selector lever cable.



- Press off retaining clip (not fitted after about 06.95) at end of selector lever cable and press ball socket of selector lever cable off selector lever at gearbox.
- -> Unbolt bracket -1- for selector lever cable below mounting bracket for shift mechanism.
- Slacken nut -2-, take off selector lever cable.

Installing

Installation is carried out in the reverse order, when doing this note the following:

Notes:

- Do not bend or kink selector lever cable.
- Lightly grease ball socket before installing.
- Bellows for selector lever cable must be fitted correctly, otherwise water can enter selector cable assembly.
- Check bellows for damage. Rear bellows can be replaced separately; front bellows can only be replaced together with complete selector lever cable.

- Use locking fluid AMV 185 101 A1 on bolts for support brackets.
- Bolt selector lever cable onto support bracket at gearbox end: tightening torque 12 Nm.
- Bolt bracket for selector lever cable to mounting bracket for shift mechanism: tightening torque 25 Nm.

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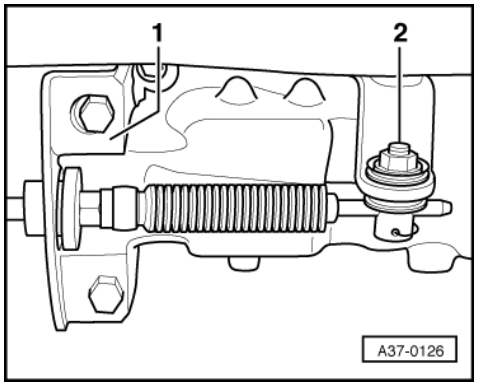
Adjusting

- Shift selector lever into "P" position.



- -> Slacken nut -2-on clamping pin for selector lever cable.
- Move selector lever on gearbox into "P" position (rear stop).
- Check that selector lever cable is routed without tension.
- Tighten nut -2- on clamping pin for selector lever cable to 20 Nm.

1.5 - Removing, installing and adjusting locking cable

Note:

Adjust locking cable after securing locking cable to ignition/starter switch (=>Page 24), and then secure to selector housing.

Removing

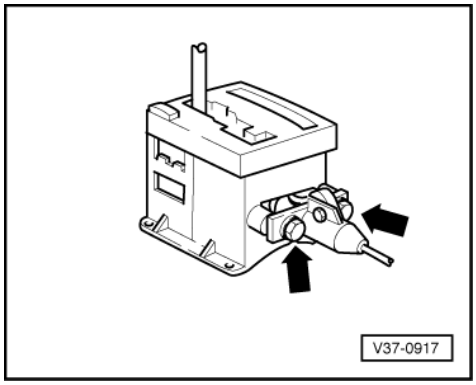
- Remove centre console

=> General body repairs; Repair group 70; Trim panels/insulation; Removing and installing front section of centre console Trim panels/insulation Removing and installing front section of centre console

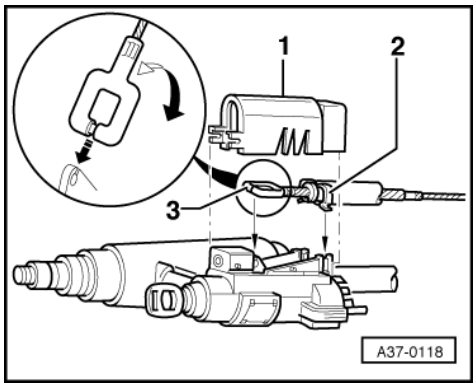
- Remove steering wheel and dash panel insert

=> Electrical system; Repair group 90; Gauges, Instruments, Radio; Removing and installing dash panel insert Gauges, Instruments, Radio Removing and installing dash panel insert

- Move selector lever into position "N".



- -> Slacken hexagon bolts -arrows-.



- -> Take off cap -1-.
- Release spring clip -2-.
- Turn end of locking cable -3- up through about 90°and pull up and out of retaining eye on ignition/starter switch.

Note:

Do not kink the locking cable when turning it upwards.

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Installing

Installation is carried out in the reverse order, when doing this note the following:

- Insert locking cable into top of retaining eye on ignition/starter switch (flat parts of locking cable and retaining eye must be aligned) and turn locking cable down through about 90°.
- Insert spring clip.

Note:

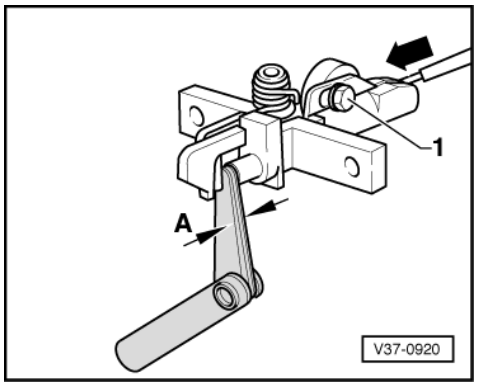
The spring clip must be engaged properly, otherwise the cap cannot be fitted.

- Fit cap on ignition/starter switch.

Adjusting

Note:

The adjustment of the locking cable is performed in the installed position.



- -> Slacken bolt -1-.
- Turn key in ignition/starter switch to "ignition on" position.
- Locate locking cable support bracket on selector housing (shift gate) and secure in position for bolting on.
- Insert feeler gauge -A- (1.5 mm) between locking arm and locking pin.
- Adjust locking cable by moving in direction of arrow so that locking pin is pushed against feeler gauge.
- Tighten bolt in this position to 10 Nm.
- Turn key in ignition/starter switch several times backwards and forwards between "ignition on" and "ignition off" positions.
- Check gap between locking pin and locking arm once again.
  - Specification: 1.2 ... 1.7 mm

- Move selector lever into position "N".
- Install locking cable on selector housing (shift gate).
- Ensure that locking cable is not kinked.
- On right-hand drive vehicles, secure locking cable to steering column console with cable clamp.

Checking function:

- Move selector lever into position "P" and turn ignition key to "ignition off" position:

- The selector lever should be locked in position "P".
- It should be possible to withdraw the ignition key.

- Turn ignition key to "ignition on" position and shift selector lever out of "P" to one of the other positions. Turn ignition key back to "ignition off" position, press down selector lever and shift to position "P". Keep selector lever pressed down and shift it back to one of the other positions.

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- It should not be possible to withdraw the ignition key.

2 - Checking gearbox

2.1 - Checking gearbox

2.2 - Performing self-diagnosis

Notes:

- Always perform self-diagnosis as a first step when tracing the cause of faults.

=> Automatic gearbox 01N, Self-diagnosis; Repair group 01; Performing self-diagnosis Performing self-diagnosis

- Only check the automatic gearbox according to the procedure described in the "Fault-finding, Transmission" binder if the fault cannot be found and rectified using self-diagnosis.

2.3 - Checking shift points

=> "Fault finding" binder; No. 10

2.4 - Checking stall speed

=> "Fault finding" binder; No. 11

2.5 - Fault finding table for "4-speed automatic gearbox"

=> "Fault finding" binder; Power transmission, No. 14

3 - Removing and installing gearbox

3.1 - Removing and installing gearbox

Special tools, testers and auxiliary items

- Engine support bracket 10-222A with supports10-222A/1
- Lifting tackle 2024 A
- Mandrel 3204
- Gearbox support 3282
- Alignment plate 3282/3
- Engine/gearbox jack V.A.G 1383 A
- Torque wrench V.A.G 1331 (5...50 Nm)
- Torque wrench V.A.G 1332 (40...200 Nm)

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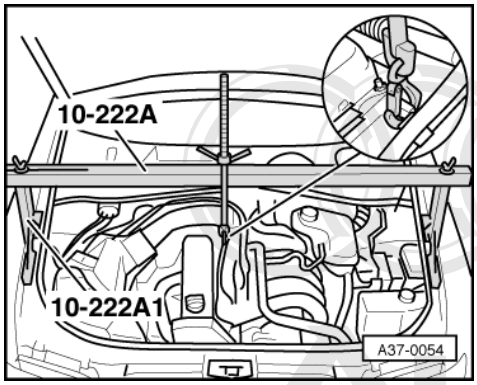
- Socket attachment, 15 mm A/F, Matra V175

Removing

- Obtain radio code on vehicles with coded radio.
- With ignition switched off disconnect battery earth strap.

Vehicles with 4-cylinder engine:

- Unscrew engine/gearbox securing bolts accessible from above.



- -> Set up engine support bracket 10-222 A with supports 10-222 A1 onto bolted flanges of wing panels.
- Take up weight of engine on spindle of support bracket 10-222 A.

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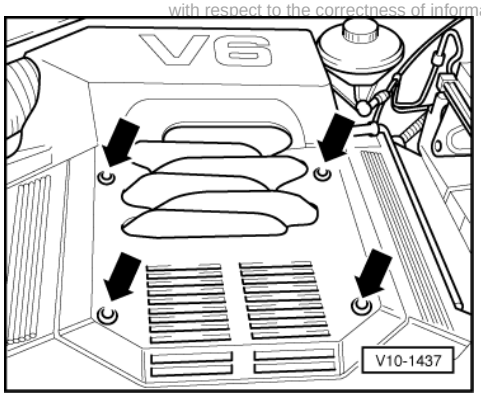
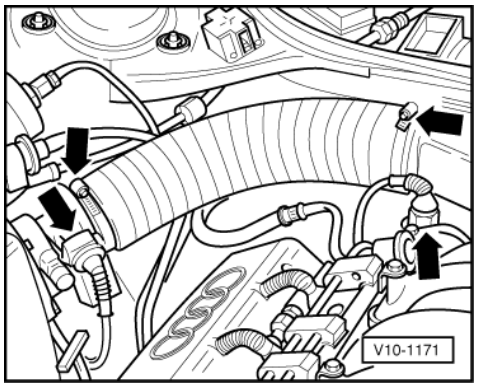
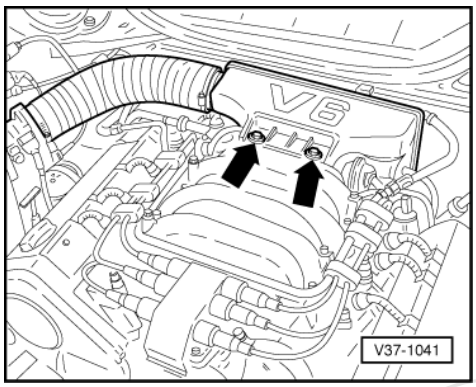
Vehicles with 6-cylinder engine:



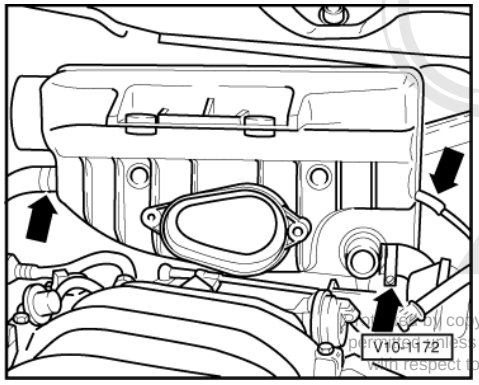
- -> Remove engine cover panel -arrows-.



- -> Remove air duct between air mass meter and intake manifold -top arrows-.



- -> Unscrew bolts securing intake silencer -arrows-.



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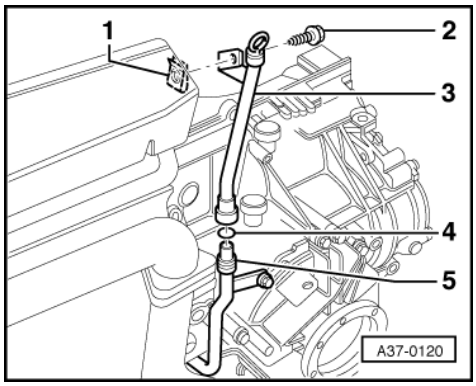
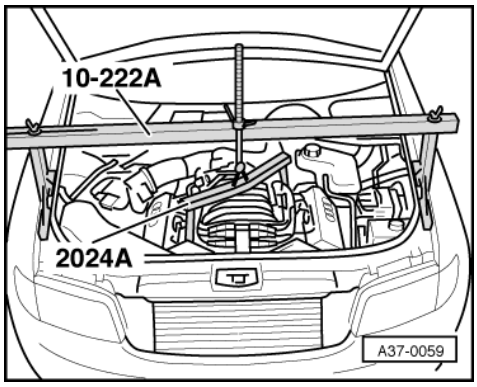
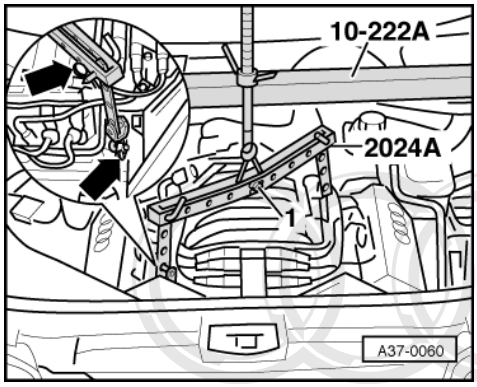
- -> Pull off the two crankcase breathers and the vacuum hose -arrows-.
- Push intake silencer to rear and then lift out.



- -> Loosen bolt -2- and pull upper ATF filler pipe -3- away from lower ATF filler pipe -5-.
- Plug lower ATF filler pipe with clean, non-fluffing cloth.
- Unscrew engine/gearbox securing bolts accessible from above.



- -> Set up engine support bracket 10-222 A on bolted flanges of wing panels with spindle at front.



- -> Remove lifting eye from lifting appliance 2024 A. Insert pin -1- in centre hole of lifting appliance again and secure with a split pin.
- Engage pin of lifting appliance 2024 A onto spindle of engine support bracket 10-222 A.
- Disconnect spark plug connectors for cylinders 1 and 6 and secure lifting appliance 2024 A at front right and rear left of engine.

Warning
The hook attachments and locating pins on the lifting tackle must be secured with locking pins (arrows in illustration).

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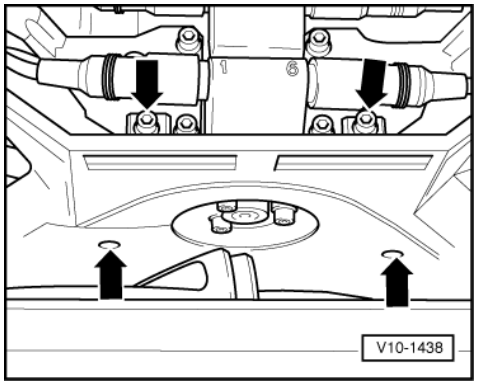
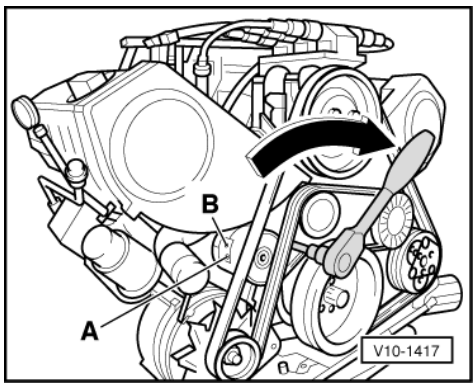
- Take up weight of engine on spindle of engine support bracket 10-222 A.



- -> Remove cover for ribbed belt -arrows-.



- -> To slacken ribbed belt, turn tensioning element in direction of arrow with Allen key (10 mm).
- Insert mandrel 3204 into holes -A- and -B- to stop tensioning element from turning.

Note:

Mark the direction of rotation with chalk or felt pen before removing the ribbed belt. If the belt rotates in the wrong direction when it is refitted, this can cause breakage. Ensure that the belt is properly seated in the pulleys when installing.

- Remove ribbed belt.

All models

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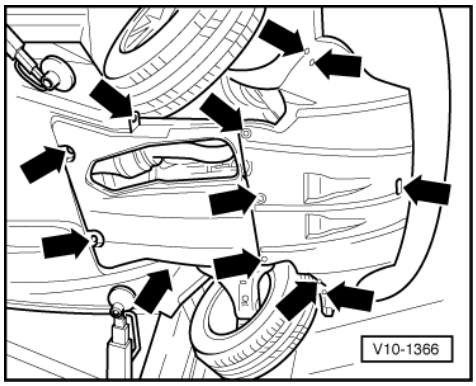
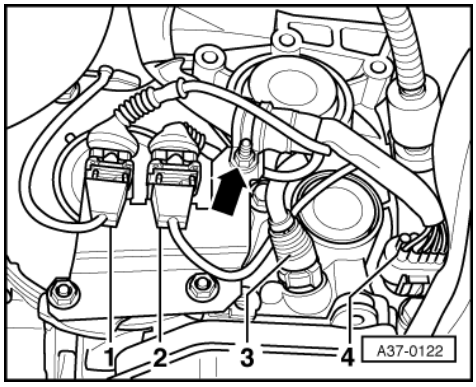


- Remove front wheels.
- -> Remove noise insulation (in 2 sections on vehicles with diesel engine) -arrows-.
- Unbolt bracket for noise insulation.
- Unbolt front exhaust pipe(s) at exhaust manifold.

- Unbolt retainer(s) for exhaust system at gearbox.
- 4-cylinder engine: remove front section of exhaust system.
- 6-cylinder engine: detach front right exhaust pipe from front left exhaust pipe; unbolt left exhaust pipe from catalytic converter without removing the catalytic converter.

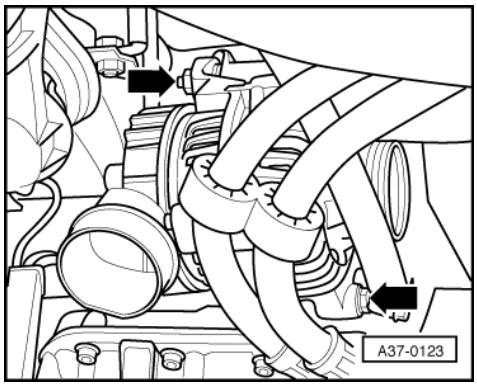


- -> Mark connectors -1 - 4- at rear of gearbox so they can be identified when re-installing, and then disconnect.
- Detach clamp for wiring harness -arrow-.
- Unplug speedometer connector at gearbox.
- If applicable, unplug connector for engine speed sender at torque converter bellhousing.
- Remove heat shield for right drive shaft.

Note:

An angled Allen key has to be ground shorter in order to loosen the bottom bolt securing the heat shield.

- Detach left/right drive shaft from gearbox flange.



=> Running gear, Front-wheel drive; Repair group 40; Front suspension; Removing and installing suspension strut and drive shaft Front suspension Removing and installing suspension strut and drive shaft

- Lift drive shafts up as high as possible and tie to body.
- -> 6-cylinder engine: remove alternator by detaching air intake hose, unbolting cable connections and loosening two securing bolts -arrows-.

- Remove starter.

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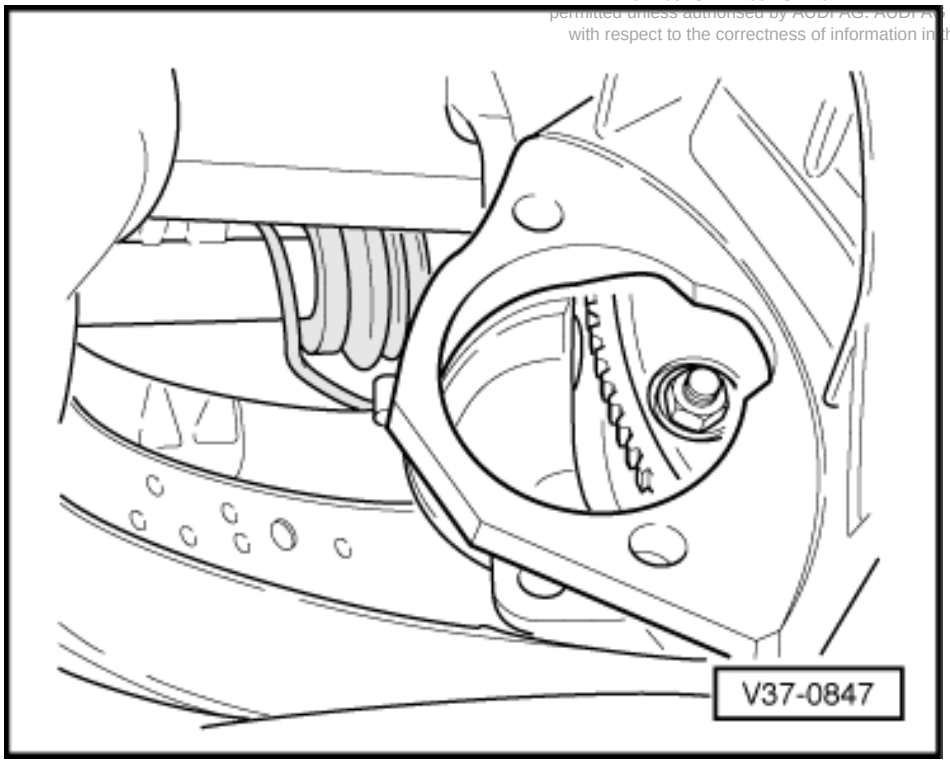
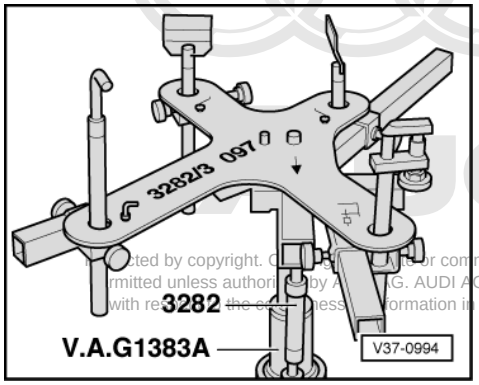


- -> Unscrew 3 torque converter nuts through starter opening using Matra V175 15 mm A/F socket attachment (turn crankshaft1/3turn each time).



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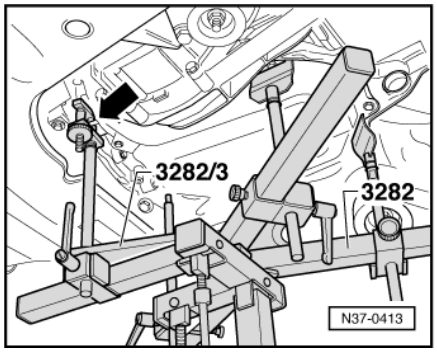
- -> Set up gearbox support 3282 with adjusting plate 3282/3 for removing automatic gearbox 01N, and mount onto jack V.A.G 1383 A.

Note:

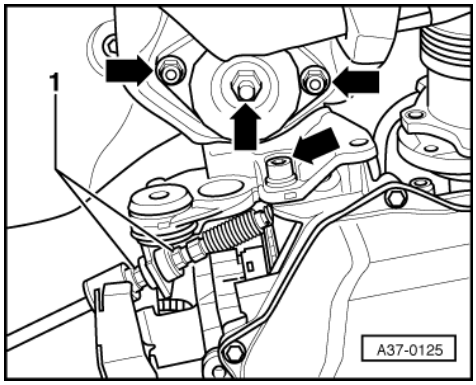
The symbols on the adjusting plate indicate the mounts required for automatic gearbox 01N. The arrow points in the direction of travel.



- -> Move jack V.A.G 1383 A with gearbox support 3282 under the gearbox and support gearbox.
- Align adjustment plate parallel to gearbox and lock safety support -arrow- on gearbox.

Note:

If gearbox support 3282 is not available, gearbox can be removed and installed using engine and gearbox jack V.A.G 1383 A and universal support V.A.G 1359/2.

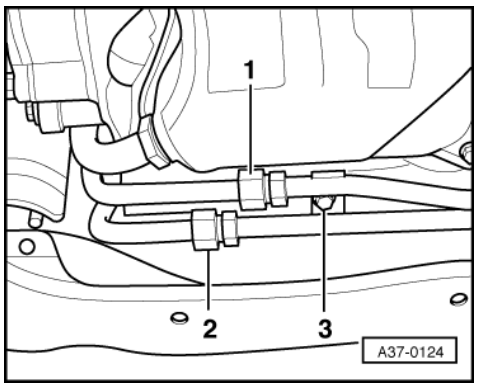


- -> Loosen the bolted connection for selector lever cable -1- on gearbox mounting (illustration shows layout for 6-cylinder).
- Detach selector lever cable from gearbox support.
- 6-cylinder engine: dismantle and remove right gearbox support -arrows-. The rubber bush should be removed at the same time=>Page 37 .

- Press retaining clip (not fitted after about 06.95) off end of selector lever cable and press ball socket of selector lever cable off gearbox selector lever.
- Move selector lever cable clear to the side.
- 4-cylinder engine: unbolt rear gearbox support at body=>Page 37 .
- 6-cylinder engine: remove left gearbox support without removing rubber bush.

Notes:

- When disconnecting ATF pipes, observe rules for cleanliness for automatic gearbox=>Page 47 .



- Clean connections of ATF pipes before disconnecting.
- Note layout of ATF pipes=>from Page 48 .

- Unbolt brackets for front ATF pipes on engine. Illustration of various brackets=>from Page 48 .
- -> Disconnect ATF pipes at connections -1- and -2-, unbolt attachment -3- (illustration shows 6-cylinder engine).

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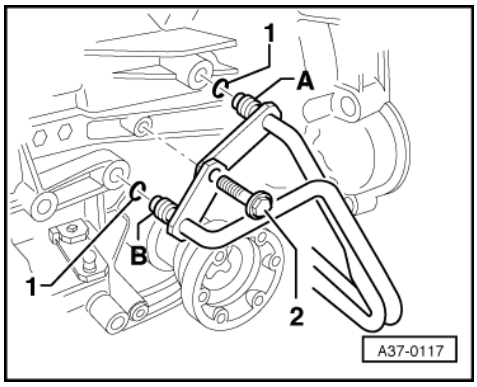
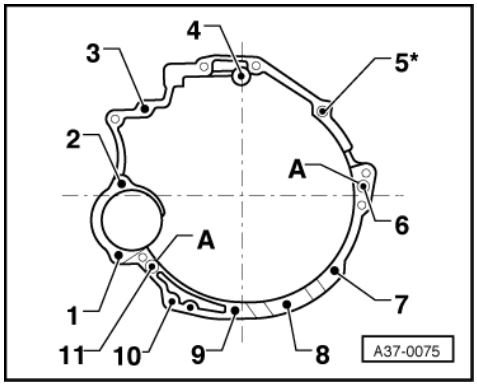
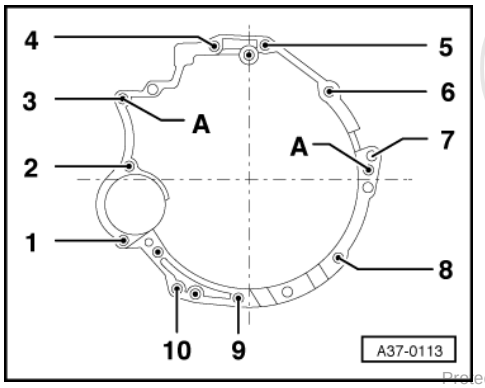


- -> Unscrew bolt -2-. Pull ATF pipes -A- and -B- away from gearbox and detach.



- -> 4-cylinder engine: unscrew bolts -1 - 11- at engine / gearbox flange.



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- -> 6-cylinder engine: unscrew bolts -1 - 10- at engine / gearbox flange.
- Separate gearbox from engine.
- Using a suitable lever, press torque converter off engine drive plate.
- Press gearbox slightly to the right and lower out of vehicle.

Notes:

- If necessary, slacken spindle on support bracket 10-222 A.
- Ensure adequate clearance between bulkhead and engine.

- Secure the torque converter to prevent it from dropping out.

Installing

Installation is carried out in the reverse order, when doing this note the following:

Note:

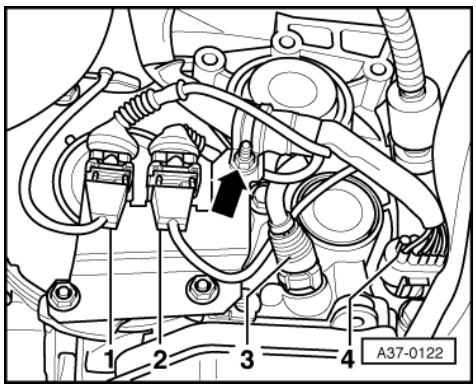
Before installing a replacement gearbox, clean the ATF pipes and the ATF cooler => Page 53 .

- Before installing the gearbox, ensure that the torque converter has been fitted correctly in the gearbox => Page 10 .
- Before installing gearbox, make sure that dowel sleeves are correctly seated on cylinder block.
- Fit intermediate plate onto dowel sleeves.
- Make sure that no wiring or pipes are trapped when bringing engine and gearbox together.
- To secure the torque converter on the drive plate only use the correct nuts as specified in the parts catalogue.

=> Parts catalogue

- Tighten torque converter nuts with Matra V175 15 mm A/F socket attachment.
- Always replace self-locking nuts and bolts.

- Replace all gaskets and O-rings.



- -> Plug in connectors -1 - 4- as marked during removal. Do not confuse connectors -1- and -2-: connector -1- is for gearbox speed sender -G38 (on left side of gearbox); connector -2- is for road speed sender -G68 (on right side of gearbox).
- Adjust selector lever cable=>Page 22 .
- Check oil level in final drive of automatic gearbox=>Page 154 .
- Check ATF level=>Page 38 .
- After connecting battery, enter anti-theft code for radio

=> Radio operating instructions

- Set clock to correct time.

Tightening torques

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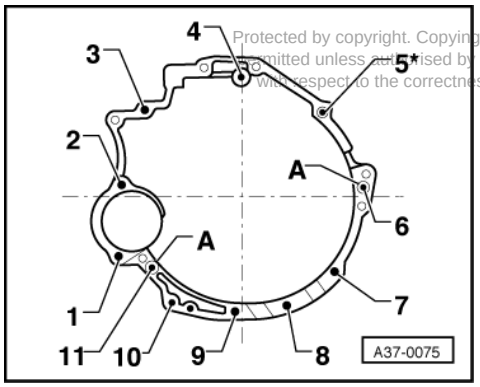
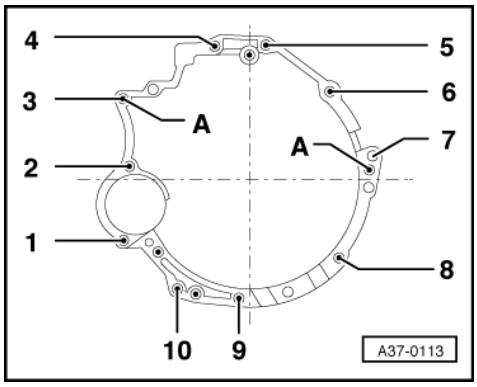


-> Gearbox to engine (4-cylinder)

Item No.	Bolt	Nm
1	M12 x 50	65
2, 3, 4	M12 x 67	65
5, 6	M12 x 90	65
7, 8, 9, 10	M10 x 45	45
11	M12 x 67	65

A: centring sleeves



-> Gearbox to engine (6-cylinder)

Item No.	Bolt	Nm
1	M12 x 75	65
2	M12 x 110	65
3, 4, 5	M12 x 67	65
6	M12 x 80	65

Item No.	Bolt	Nm
7	M12 x 67	65
8, 9, 10	M10 x 45	45

A: centring sleeves

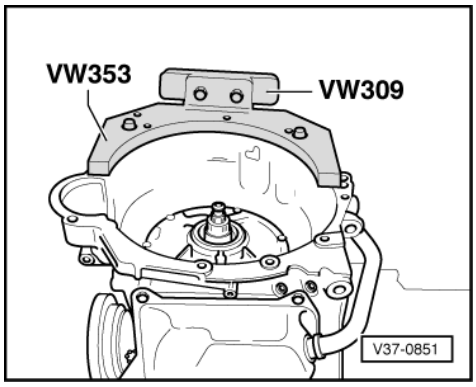
Component		Nm
Drive plate to torque converter		85
ATF pipes to gearbox		20
Brackets for ATF pipes		10
ATF pipe to ATF pipe		25
Gearbox support to gearbox		40
Gearbox support to gearbox mounting		40
Gearbox mounting to subframe		23
Drive shaft to gearbox	M8	40
	M10	80
Alternator to mounting		20

3.2 - Securing gearbox to repair stand

Special tools, testers and auxiliary items

- Holding plate VW 309
- Support clamp VW 313
- Gearbox support VW 353

- Remove gearbox=>Page 25 .
- Remove torque converter or secure it to prevent it dropping out.



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- -> Secure gearbox to gearbox support VW 353 with plate VW 309 and fit to support clamp VW 313.

Warning
The centre of gravity of the gearbox is outside the pivot centre of the support clamp. A second fitter has to hold the gearbox housing when it is being turned to prevent it from swinging round.

3.3 - Removing and installing gearbox support

Special tools, testers and auxiliary items

- Gearbox support 3282
- Alignment plate 3282/3
- Engine/gearbox jack V.A.G 1383 A

Audi
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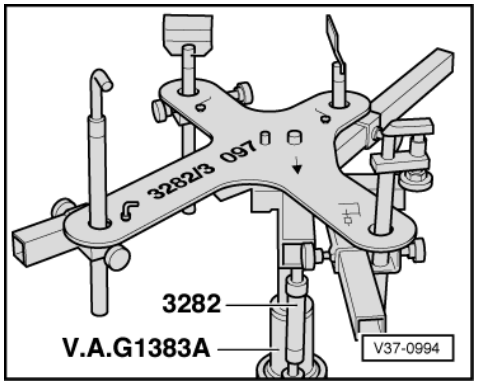
Vehicles with 4-cylinder engine:

If the rear gearbox support is removed, the gearbox must be supported as described.

Vehicles with 6-cylinder engine:

- If both gearbox supports are removed, the gearbox must be supported as described.
- If only one of the gearbox supports is to be removed, the gearbox does not need to be supported.

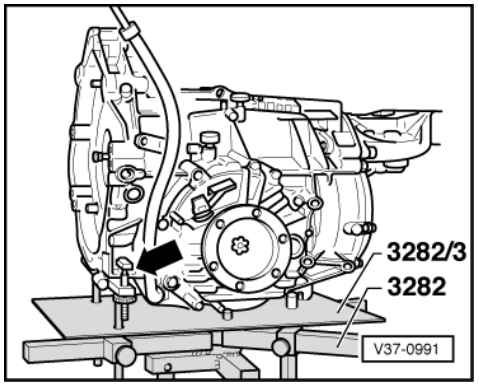
All models



- -> Set up gearbox support 3282 with adjusting plate 3282/3 for removing automatic gearbox 01N, and mount onto jack V.A.G 1383 A.

Note:

The symbols on the adjusting plate indicate the mounts required for automatic gearbox 01N. The arrow points in the direction of travel.



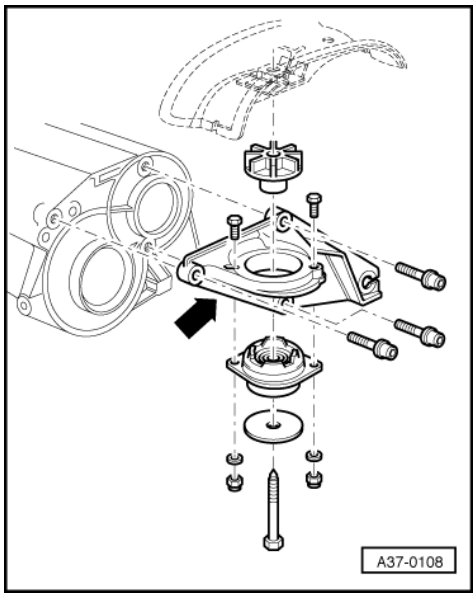
- -> Move jack V.A.G 1383 A with gearbox support 3282 under the gearbox and support gearbox.
- Align adjustment plate parallel to gearbox and lock safety support -arrow- on gearbox.

Note:

If gearbox support 3282 is not available, gearbox can be supported using engine and gearbox jack V.A.G 1383 A and universal support V.A.G 1359/2.

Vehicles with 4-cylinder engine:

- Unbolt and detach selector lever cable.



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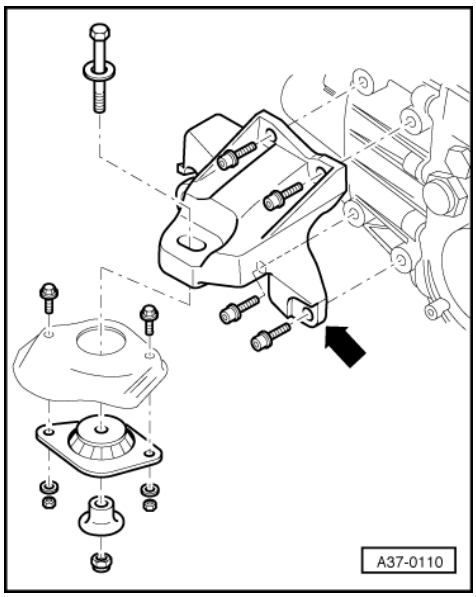
- -> Remove rear gearbox support -arrow-.

Vehicles with 6-cylinder engine:

- Detach guard plate for right bonded rubber bush.
- Remove heat shield for right drive shaft.

Note:

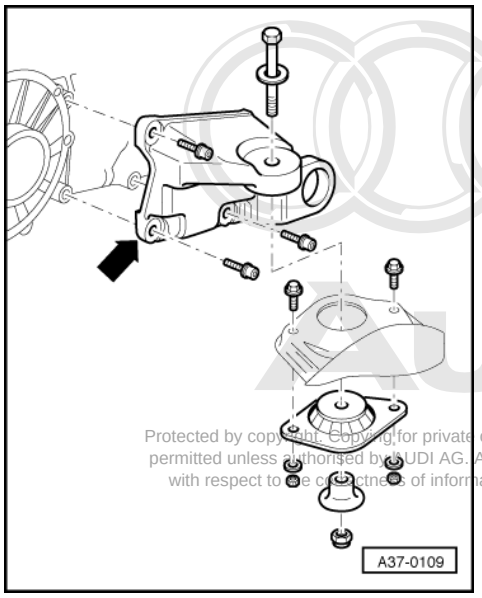
An angled Allen key has to be ground shorter in order to loosen the bottom bolt securing the heat shield.



- Unbolt and detach selector lever cable.
- Unbolt bracket for exhaust system.

- -> Remove right-hand gearbox support -arrow-.

- Detach guard plate for left bonded rubber bush.
- Unbolt bracket for exhaust system.



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- -> Remove left-hand gearbox support -arrow-.

Tightening torques

Component	Nm
Gearbox support to gearbox	40
Gearbox support to gearbox mounting	40
Gearbox mounting to subframe	23

4 - Checking and topping up ATF level

4.1 - Checking and topping up ATF level

4.2 - Checking ATF level

Special tools, testers and auxiliary items

- Fault reader V.A.G 1551 (or vehicle system tester V.A.G 1552) with cable V.A.G 1551/1
- Drip tray V.A.G 1306
- ATF filling system V.A.G 1924 and protective goggles (only for vehicles with 4-cylinder engine).

Requirements for test:

- Vehicle in horizontal position.
- Gearbox not in emergency running mode.
- The ATF temperature must not be higher than 35°C at the start of the test.
- Selector lever at position "P", engine idling.

- Air conditioner and heating switched off.

Note:

Use only ATF G 052 162 A (transparent and slightly yellow) for topping up.Do notuse any additives.

Container sizes:

- 0.5 ltr. - Part No. G 052 162 A1
- 1.0 ltr. - Part No. G 052 162 A2

Work sequence:

Notes:

- The ATF level will vary according to the temperature of the ATF.
- If the ATF level is checked when the ATF temperature is too low, this will result in overfilling.
- If the ATF level is checked when the ATF temperature is too high, this will result in underfilling.
- Overfilling or underfilling will impair the function of the gearbox.
- The ATF temperature can be checked using fault reader V.A.G 1551.

- Shift selector lever into "P" position and let engine idle.
- Connect fault reader V.A.G 1551, enter address word "02 Gearbox electronics" and advance until "Select function XX" is indicated on display

=> Automatic gearbox 01N; Repair group 01; Performing self-diagnosis; Connecting fault reader V.A.G 1551 (or fault reader V.A.G 1552) and selecting function Performing self-diagnosis Connecting fault reader V.A.G 1551 (or fault reader V.A.G 1552) and selecting function

-> Indicated on display:

```
Rapid data transfer      HELP
Select function XX
```

- Enter "08" to select the function "Read measured value block" and confirm entry with Q key.

-> Indicated on display:

```
Read measured value block
Enter display group number XXX
```

- Enter "005" for display group 005 and confirm entry with Q key.

-> Indicated on display:

```
Read measured value block     5
305 C     0011011     0     900 rpm
```

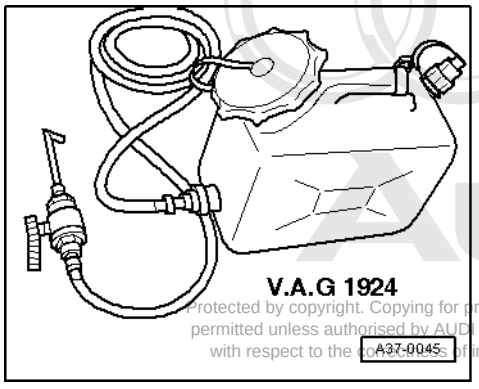
- Check ATF temperature in display zone 1.

Vehicles with 4-cylinder engine:

Notes:

- The ATF level is checked at the ATF inspection plug.
- If the ATF level is correct, a small amount of fluid will come out at the ATF inspection plug when ATF temperature is between 35 ° and 45 °C 1) (the fluid level will rise slightly as the temperature increases).

1)50°C for tropical countries



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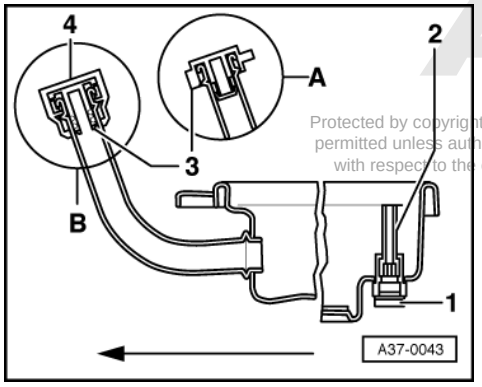
- -> Secure reservoir of ATF filling system V.A.G 1924 at the highest possible point on the vehicle.
- Raise vehicle.
- Place drip tray V.A.G 1306 below gearbox.

Warning!
Wear eye protection



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- -> When the ATF has reached a temperature of 35°C, unscrew ATF inspection plug -1- and drain off excess ATF if necessary.

Note:

There is always a small amount of ATF in the overflow pipe -2-. This should not be confused with the small quantity of ATF which will come out if the ATF level is correct.

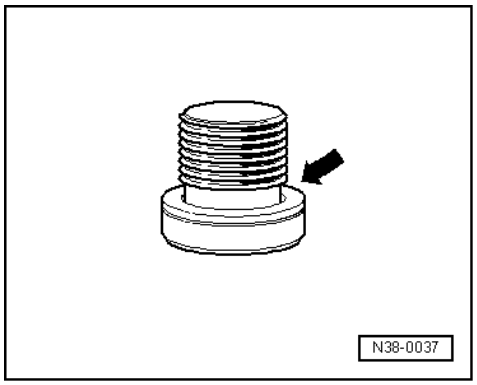
- Check that the overflow pipe -2- is screwed all the way in (2 Nm; 5 mm hexagon socket).

- If ATF comes out at the inspection plug before the ATF has reached a temperature of 40°C, the ATF level is correct.

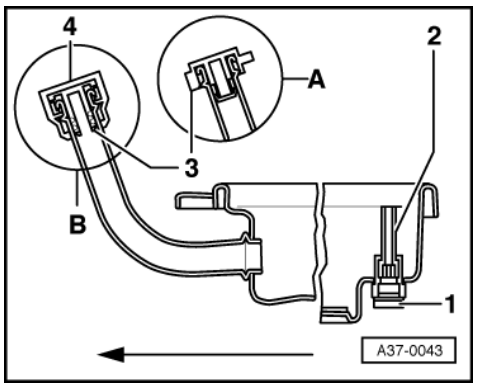
Note:

The ATF inspection plug must be screwed in again before the ATF reaches a temperature of 45°C1).

1)50°C for tropical countries



- -> Cut open seal -arrow- on ATF inspection plug with side-cutters. Fit new seal.
- Tighten ATF inspection plug to 15 Nm.



- -> If no ATF comes out at the ATF inspection plug when the temperature has reached 40°C, pull sealing plug -3- off filler pipe (on version A) or pull sealing cap -4- off filler pipe (on version B).

Note:

It is not possible to remove sealing cap -4- without destroying it. The sealing cap must always be replaced.

- If necessary, fill up with ATF via the ATF filler pipe using V.A.G 1924 filler equipment until the ATF comes out at the inspection plug -1-.

Warning!
If the ATF level is too high or too low it will adversely affect the operation of the gearbox.

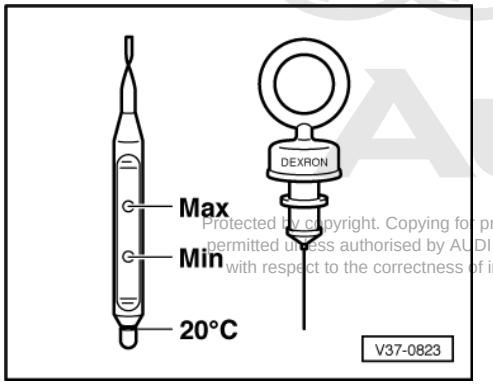
- Tighten ATF inspection plug to 15 Nm.
- Fit new sealing cap or sealing plug.
- Press the ⇒key.
- Press keys 0 and 6 for the function "End output" and confirm entry with the Q key.

Vehicles with 6-cylinder engine:

Note:

The ATF level can be checked with the ATF dipstick.

- When the ATF has reached a temperature of about 50°C, pull out the ATF dipstick and wipe it clean using a non-fluffing cloth.
- Insert the ATF dipstick all the way into the ATF filler pipe and pull it out again.
- Check ATF level on dipstick.



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- -> If the ATF level is between the min. and max. markings at a temperature of 50 - 70°C, the ATF level is OK.

Notes:

- The ATF level must not be checked at temperatures above 70°C. If necessary, wait for the ATF to cool down again.

- The markings on the ATF dipstick are for an ATF temperature of 60°C.

- If ATF level is too low:

- Fill up with ATF using a clean funnel.
- With vehicle stationary and engine running, move selector lever through all selector lever positions.
- Check ATF level again at test temperature.

- If ATF level is too high:

- Draw off excess ATF using oil extractor V.A.G 1358 A and oil suction probe V.A.G 1358/A 1.
- Check ATF level again at test temperature.

Warning!
If the ATF level is too high or too low it will adversely affect the operation of the gearbox.

4.3 - Changing ATF or filling up after repairs

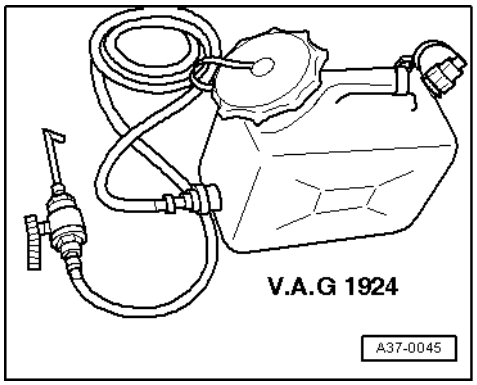
- Engine not running

Special tools, testers and auxiliary items

- Drip tray V.A.G 1306
- ATF filler system V.A.G 1924 (only for vehicles with 4-cylinder engine)
- Oil extractor V.A.G 1358 A with oil suction probe V.A.G 1358 A/1 (only for vehicles with 6-cylinder engine).

Notes:

- Observe environmental requirements for disposal.



- The engine must not be started and the vehicle must not be towed if there is no ATF in the gearbox!

Vehicles with 4-cylinder engine:

- -> Secure reservoir of ATF filling system V.A.G 1924 at the highest possible point on the vehicle.
- Raise vehicle.
- Place drip tray V.A.G 1306 below gearbox.

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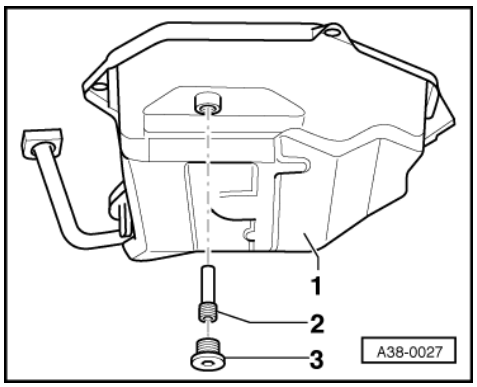
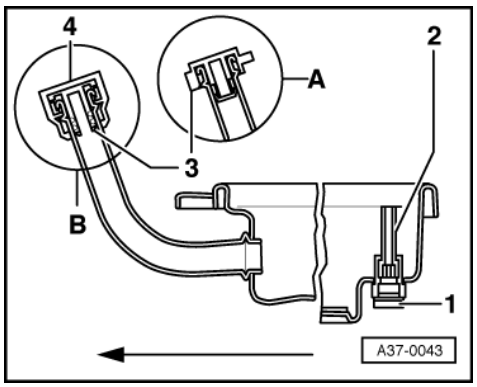


- -> Remove ATF inspection plug -3- and overflow pipe -2- (5 mm hexagon socket).
- Drain ATF.
- Screw overflow pipe -2- in again onto stop (tightening torque: 2 Nm).



- -> Remove sealing cap -4- or sealing plug -3- at ATF filler pipe.

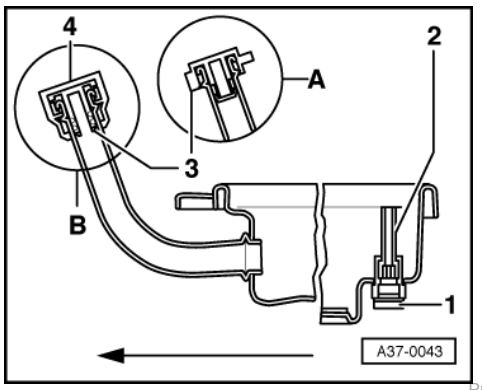
Note:

Sealing cap -4- for version -B- is damaged on removal and must be replaced.

Filling up ATF

Note:

The ATF temperature must not be higher than 35°C at the start of the filling procedure.



- -> Fill up with ATF using V.A.G 1924 filler equipment until ATF comes out at inspection hole -1-.
- Shift selector lever into "P" position.
- Start engine.
- With engine running, continue adding ATF until ATF comes out at inspection hole -1-.

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Warning!
If the ATF level is too high or too low it will adversely affect the operation of the gearbox.

- With the engine idling, press the brake pedal and shift the selector lever through all the selector lever positions, leaving the selector lever 2 - 3 seconds in each position.
- Shift selector lever into "P" position.
- Check and top up ATF level =>from Page 38 .

Note:

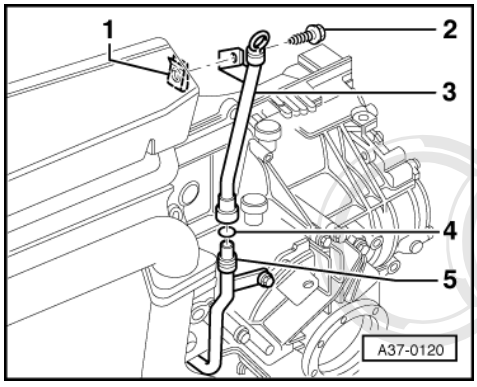
Observe all notes and test requirements as for "Checking ATF level".

Vehicles with 6-cylinder engine:

- Extract ATF with oil extractor V.A.G 1358 A and oil suction probe V.A.G 1358/A 1.

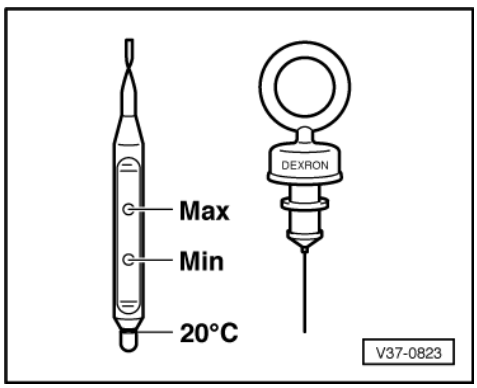
or

- Raise vehicle.
- Place drip tray VW 1306 below gearbox.



- -> Unscrew union nut on lower ATF filler pipe -5- and pull filler pipe out of oil pan.
- Drain off ATF and re-attach ATF filler pipe: tightening torque 80 Nm.
- First put in approx. 3.0 litres of ATF using a funnel.
- Shift selector lever into "P" position.
- Start engine.
- With the engine idling, depress the brake pedal and shift the selector lever through all the selector lever positions, leaving the selector lever 2 - 3 seconds in each position.
- Shift selector lever into "P" position.
- Pull out ATF dipstick and wipe clean using a non-fluffing cloth.

- Insert the ATF dipstick all the way into the ATF filler pipe and pull it out again.
- Check ATF level on dipstick.



- -> ATF should be filled up to the 20°C mark when cold.

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Warning!
If the ATF level is too high or too low it will adversely affect the operation of the gearbox.

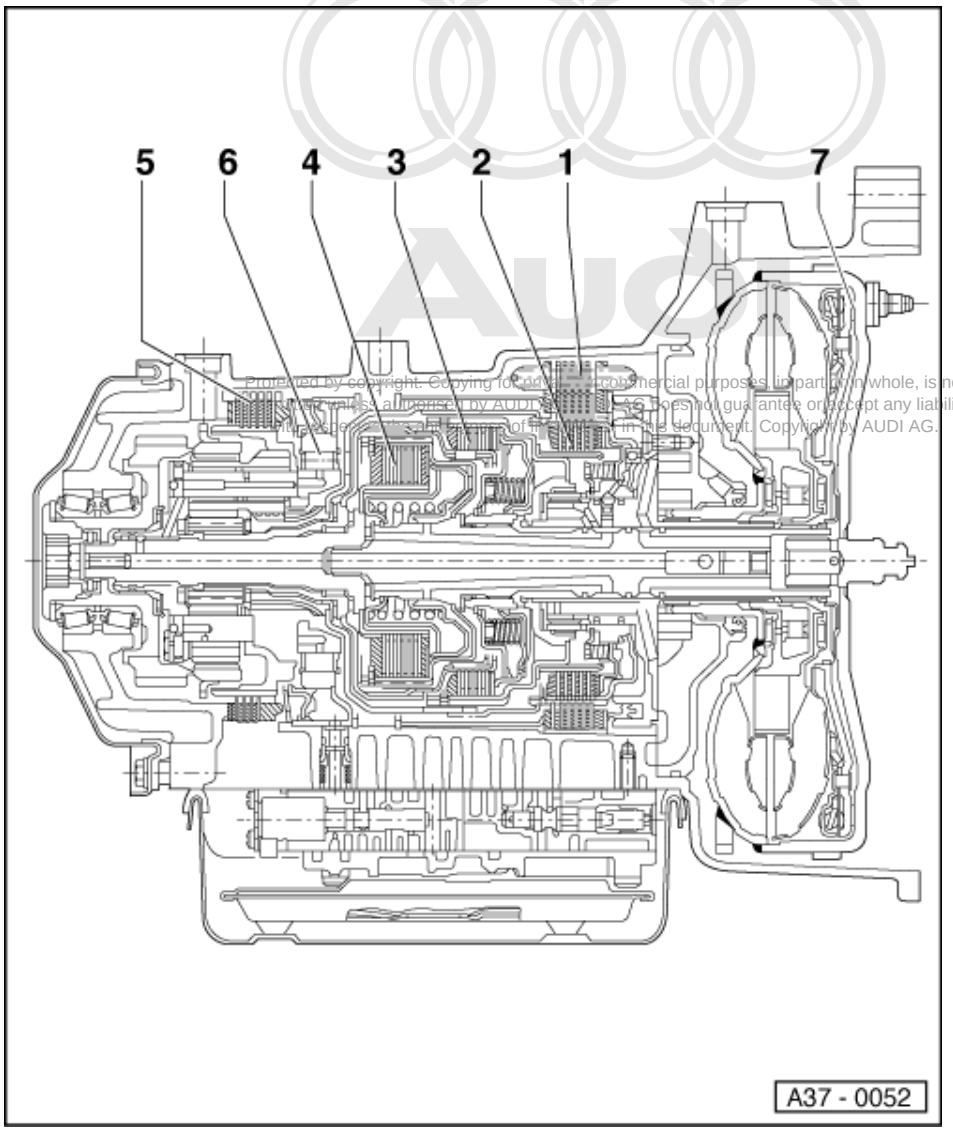
- Check and top up ATF level =>from Page 38 .

Note:

Observe all notes and test requirements as for "Checking ATF level".

5 - Gearbox with selector elements

5.1 - Gearbox with selector elements



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Position of selector elements

1 = 2nd and 4th gear brake -B2-

2 = Reverse gear clutch -K2-

3 = 1st to 3rd gear clutch -K1-

4 = 3rd and 4th gear clutch -K3-

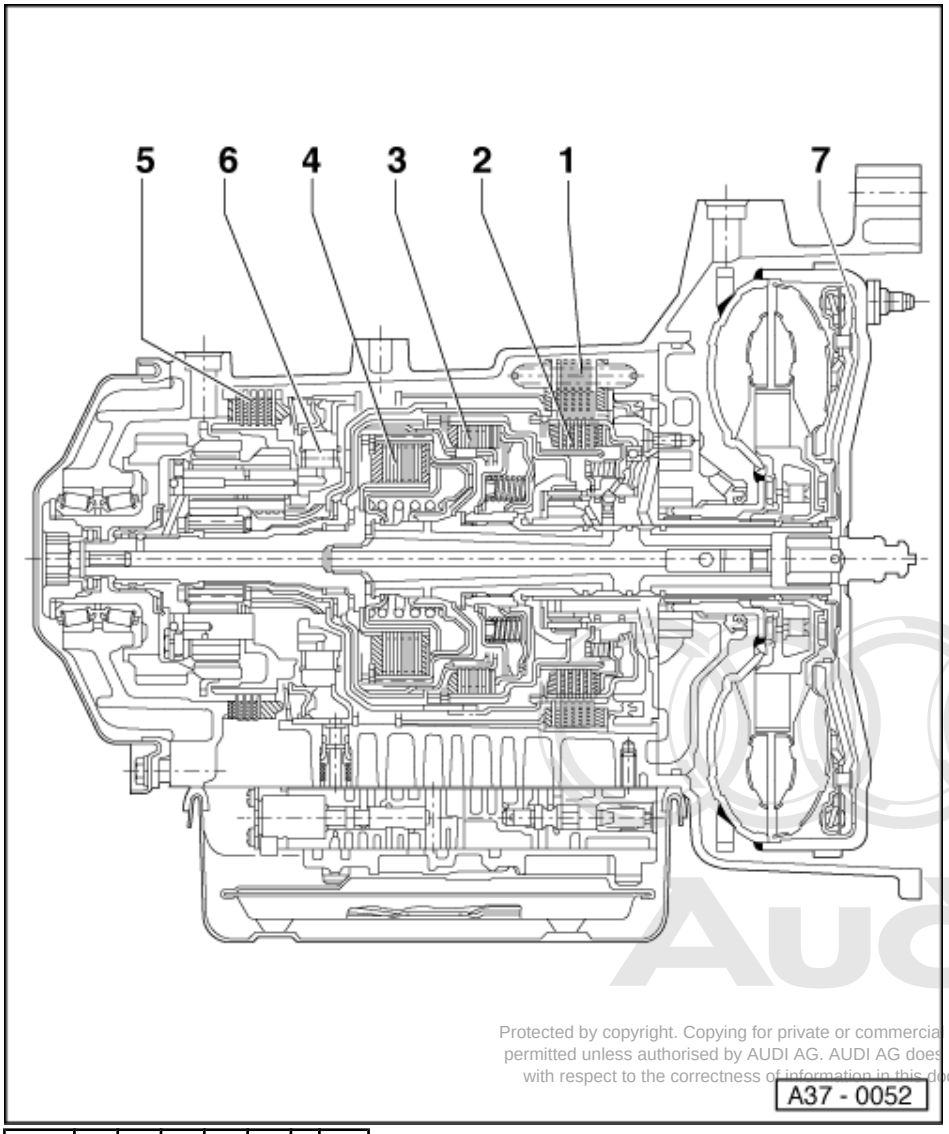
5 = Reverse gear brake -B1-

6 = Free wheel clutch

7 = Torque converter lock-up clutch (Wk)

The following table shows which selector elements are operated in the individual gears to help you deal with complaints regarding poor acceleration and speed performance or generally with drive train faults. The table makes it possible to determine which selector elements are not operating properly.

5.2 - Position of selector elements



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Gear	B1	B2	K1	K2	K3	F	Wk
R	X			X			
1H			X			X	
1M			X			X	X
2H		X	X				

2M		X	X				X
3H			X		X		
3M			X		X		X
4H		X			X		
4M		X			X		X

X = clutches, brakes or free wheel engaged
H = hydraulic
M = mechanical

Before starting repairs to the gearbox, first carry out the self-diagnosis.

=> Automatic gearbox 01N; Repair group 01; Self-diagnosis Self-diagnosis

6 - Dismantling and assembling gearbox

6.1 - Dismantling and assembling gearbox

- Observe general repair instructions=> Page 4 .

6.2 - Rules for cleanliness when working on the automatic gearbox

- Thoroughly clean connections and the surrounding area before disconnecting.
- Place removed parts on a clean surface and cover over. Use plastic sheeting or paper. Do not use fluffing cloths.
- Carefully cover over or plug opened components if the repair cannot be completed immediately.
- Install only clean parts: do not remove replacement parts from their wrapping until just before installing.

- Always replace O-rings, seals and gaskets.
- Lightly lubricate O-rings with ATF before fitting to prevent the rings being trapped and damaged when components are installed.
- Do not use any other lubricants in or on components that are lubricated with ATF. Otherwise, problems may occur with the hydraulic actuation of the gearbox.
- After installing, check the gear oil level and ATF level. Top up if necessary.

6.3 - Removing and installing ATF pipes

Notes:

- Observe rules for cleanliness when working on the automatic gearbox=> Page 47 .
- Thoroughly clean connections and immediate vicinity before loosening.
- Insert ATF pipes completely by hand onto stop in gearbox or cooler and then screw on.
- After renewing ATF pipes check ATF level =>Checking ATF level and topping up, Page 38 .

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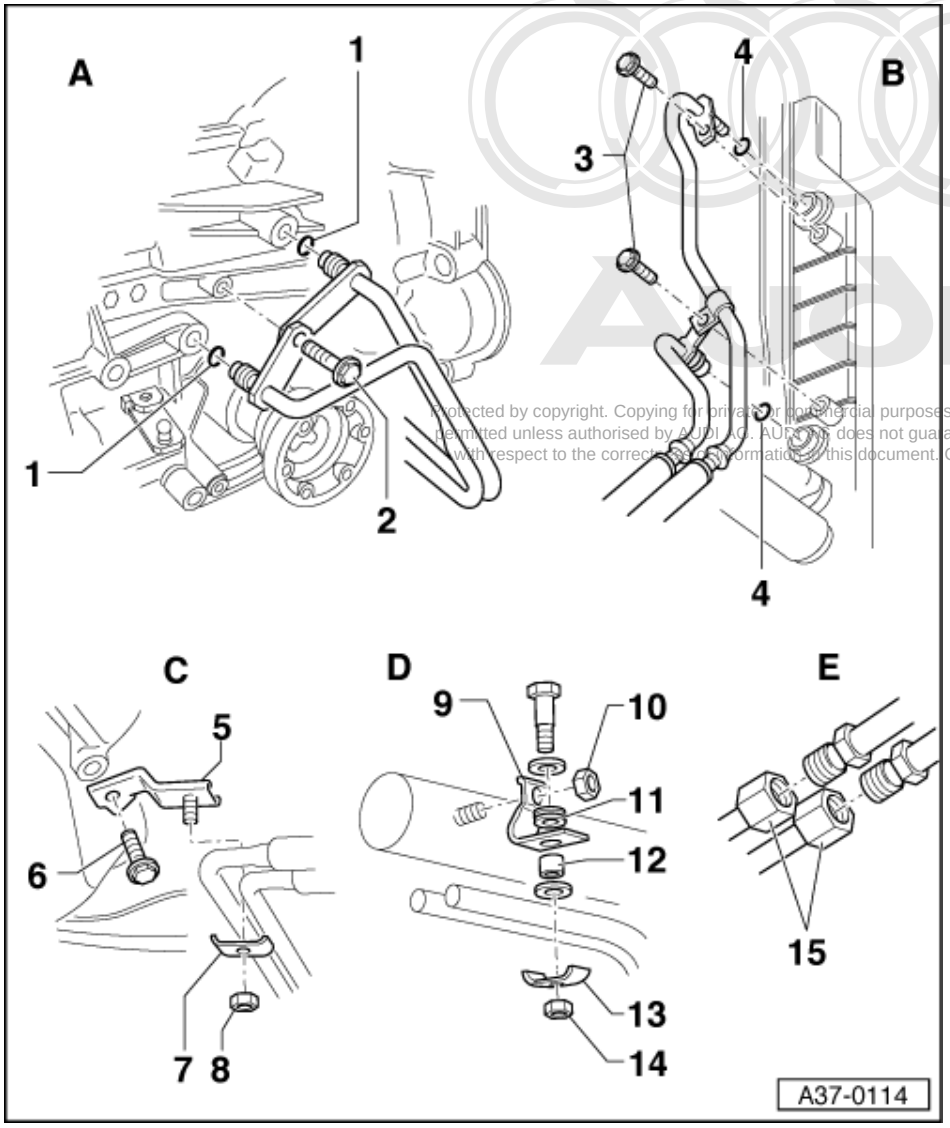
6.4 - 4-cylinder petrol engine



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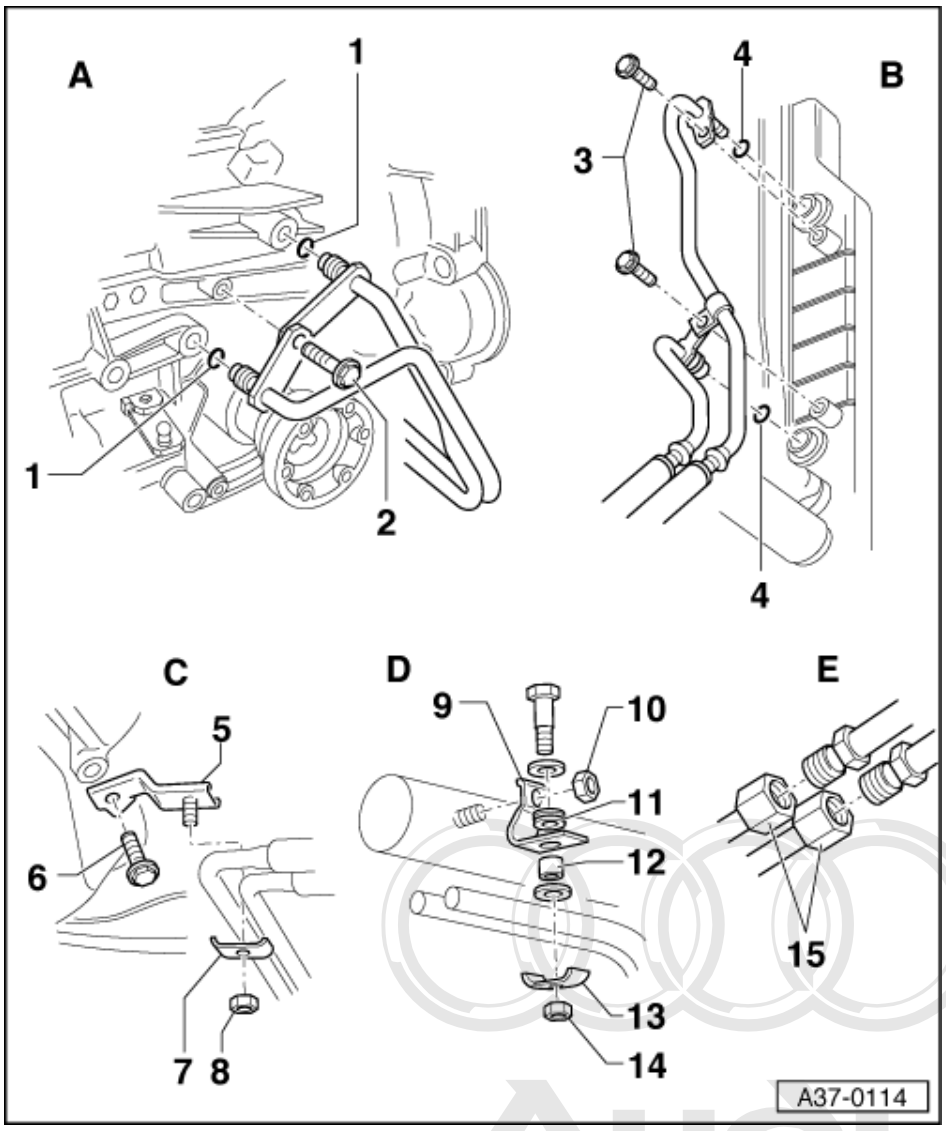
A - Attachment of ATF pipe to gearbox
B - Attachment of ATF pipe to ATF cooler
C - Attachment of ATF pipe on left side of engine
D - Attachment of ATF pipe at front of body
E - Threaded unions, ATF pipe to ATF pipe

1 O-ring
- Renew
- Lubricate withATF

2 Bolt - 20 Nm
- Insert pipes completely first and then tighten



3 Bolt - 5 Nm
- Insert pipes completely first and then tighten

4 O-ring
- Renew
- Lubricatewith ATF

5 Bracket
6 Bolt - 45 Nm
7 Clamp
8 Nut - 5 Nm
9 Bracket
10 Nut - 5 Nm
11 Rubber bush
12 Bush
13 Clamp
14 Nut - 5 Nm
15 Union nut - 25 Nm

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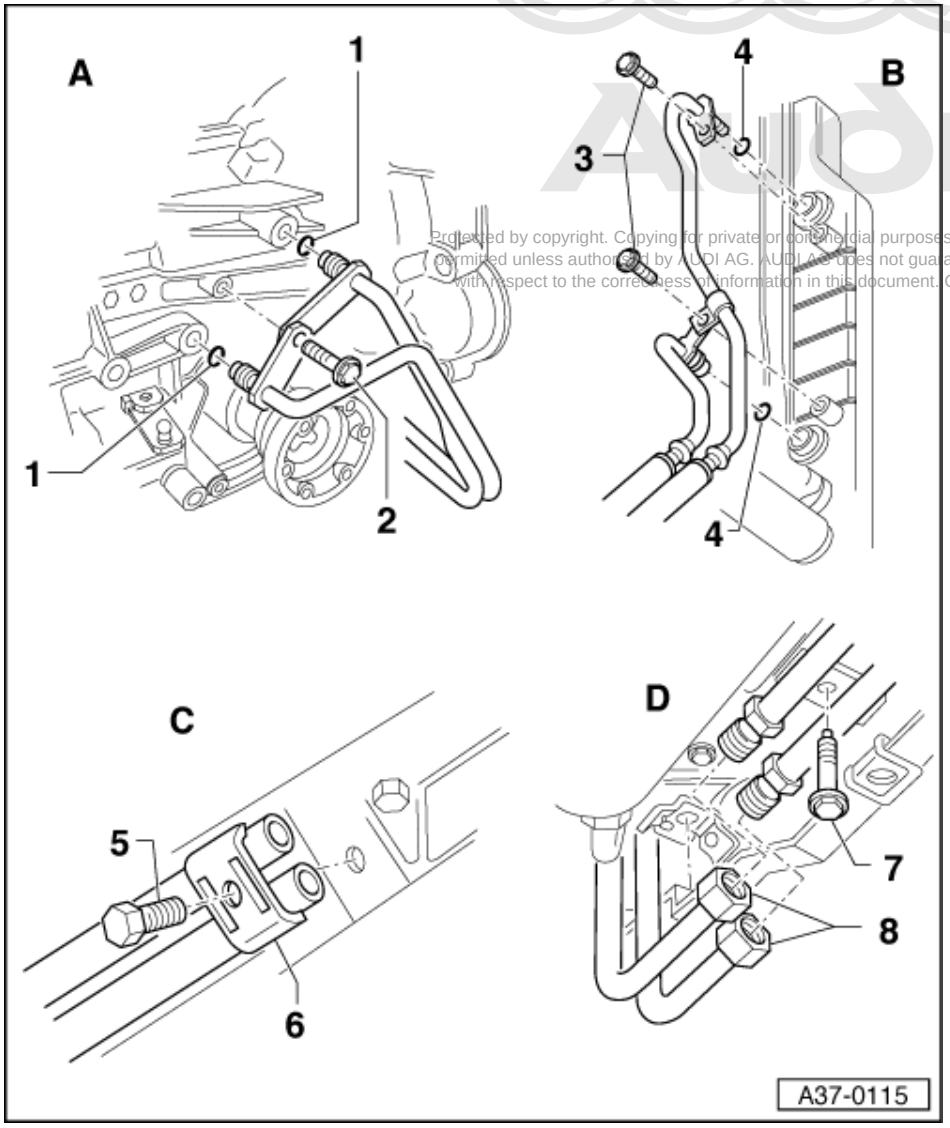
6.5 - 6-cylinder engine



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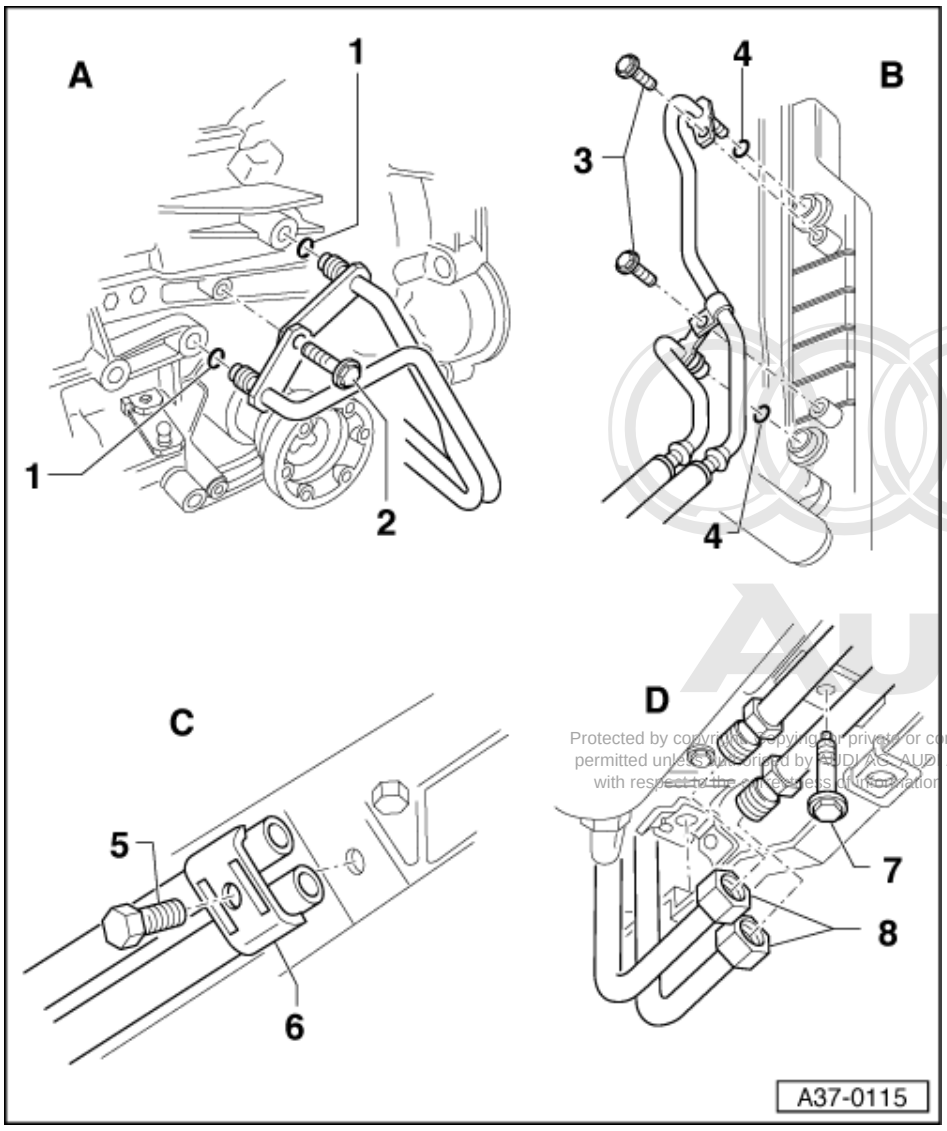
A - Attachment of ATF pipe to gearbox
B - Attachment of ATF pipe to ATF cooler
C - Attachment of ATF pipe to engine
D - Attachment of ATF pipe at rear of engine; threaded unions, ATF pipe to ATF pipe

1 O-ring
- Renew
- Lubricatewith ATF

2 Bolt - 20 Nm
- Insert pipes completely first and then tighten



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3 **Bolt - 5 Nm**
- Insert pipes completely first and then tighten

4 **O-ring**
- Renew
- Lubricatewith ATF

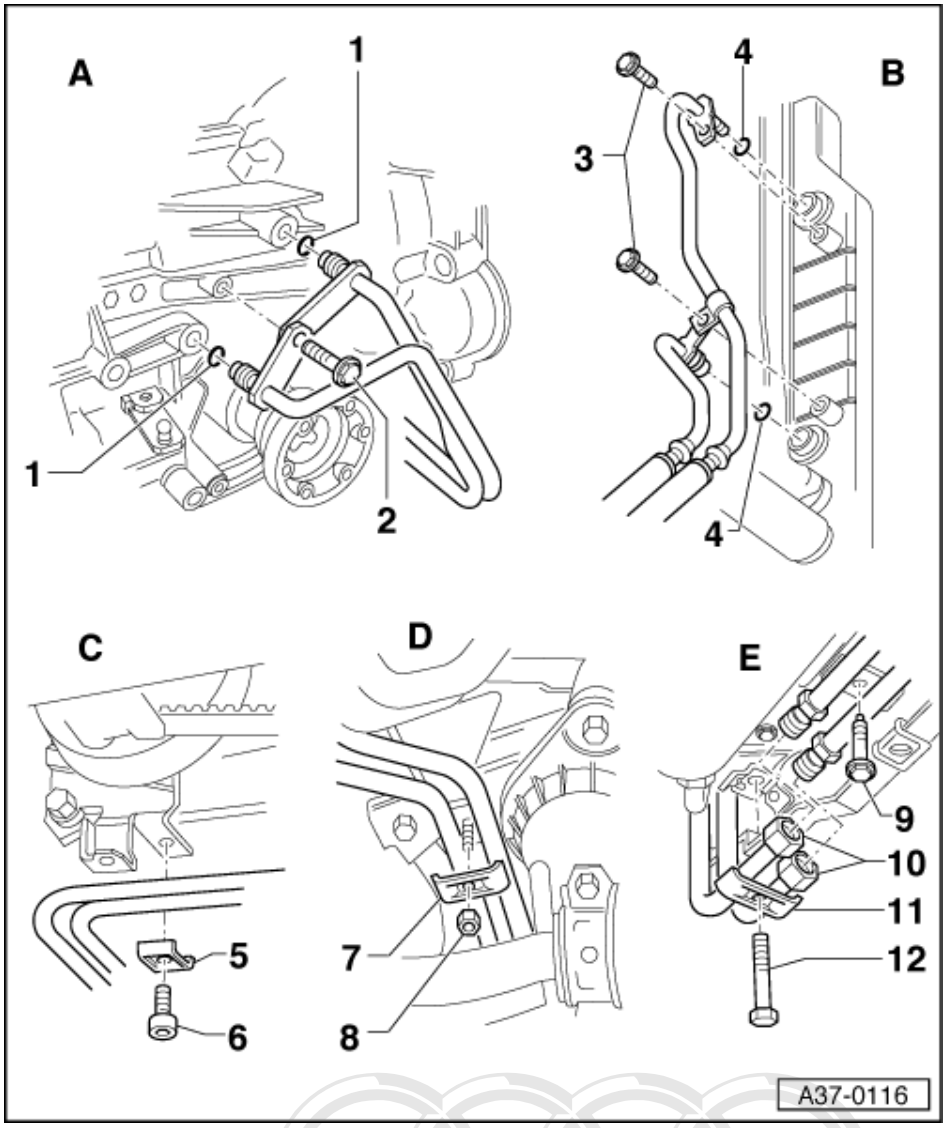
5 **Bolt - 10 Nm**

6 **Clamp**

7 **Bolt - 10 Nm**

8 **Union nut - 25 Nm**

6.6 - Diesel engine



A - Attachment of ATF pipe to gearbox
B - Attachment of ATF pipe to ATF cooler
C - Attachment of ATF pipe at front right of engine
D - Attachment of ATF pipe on left side of engine
E - Attachment of ATF pipe to rear of engine; threaded unions, ATF pipe to ATF pipe

1 O-ring
- Renew
- Lubricatewith ATF

2 Bolt - 20 Nm
- Insert pipes completely first and then tighten

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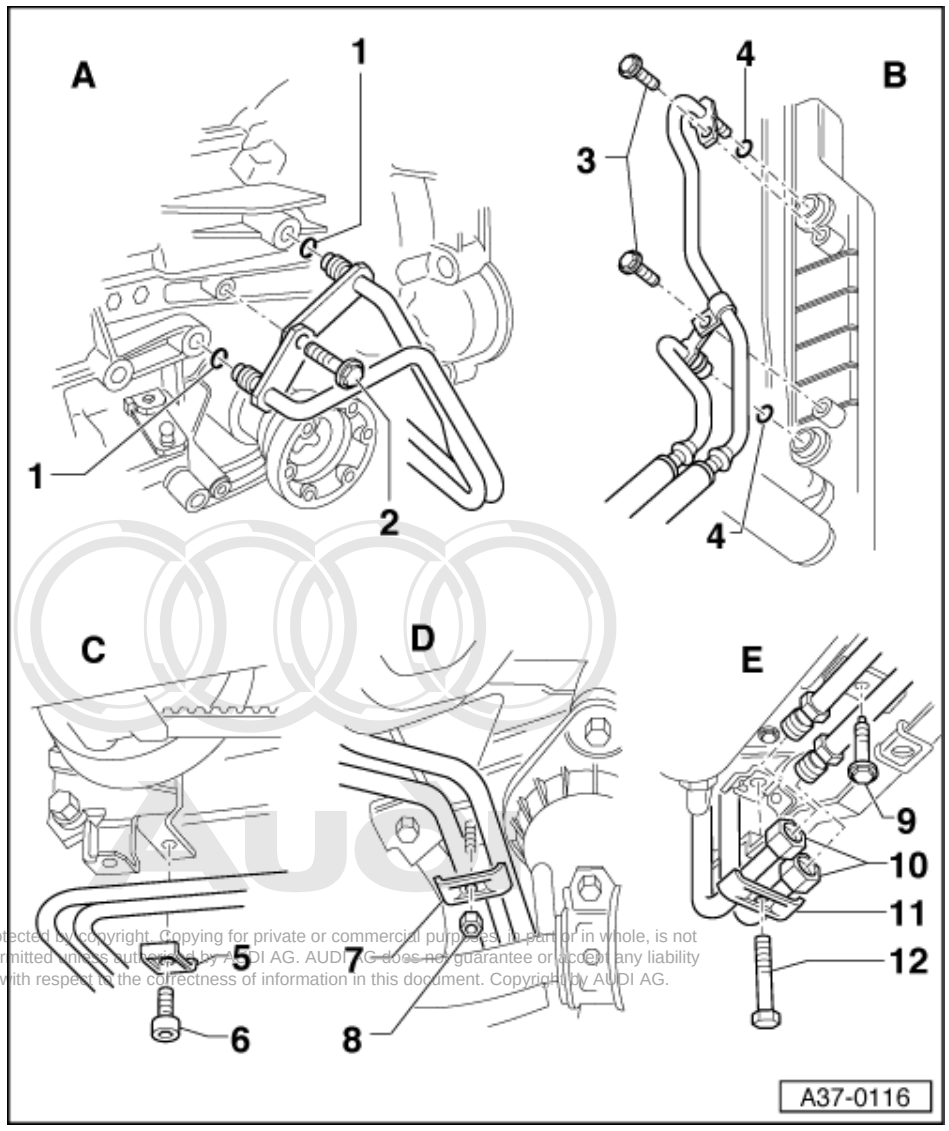

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3 Bolt - 5 Nm
- Insert pipes completely first and then tighten

4 O-ring
- Renew
- Lubricatewith ATF

5 Clamp
6 Bolt - 5 Nm
7 Clamp
8 Nut - 5 Nm
9 Bolt - 10 Nm
10 Union nut - 25 Nm
11 Clamp
12 Bolt - 5 Nm

6.7 - Cleaning ATF pipes and ATF cooler

Special tools, testers and auxiliary items

- Drip tray V.A.G 1306

- Compressed air gun (commercially available)

Notes:

- Observe notes on "Removing and installing ATF pipes"=>Page 47 .
- Before fitting a replacement gearbox, always blow through the ATF cooler and ATF pipes with compressed air (not more than 10 bar).
- To install, first insert ATF pipes into gearbox or cooler by hand as far as they will go, then bolt on.

Warning!
Wear eye protection

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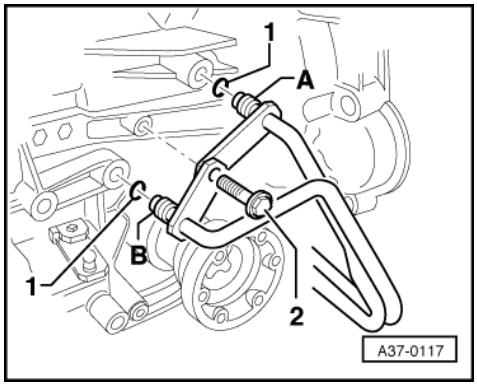
- Place drip tray V.A.G 1306 underneath.

- Unbolt brackets for ATF pipes=>from Page 48 .



- -> Unscrew bolt -2-.
- Pull ATF pipes off gearbox.
- Connect a hose to ATF pipe -A- and secure with a hose clamp. Hang other end of hose in a suitable container.
- Blow through ATF pipe -B- with a compressed air gun.
- Change hose from ATF pipe -A- over to ATF pipe -B- and repeat sequence.
- Secure ATF pipes again.
- Check and top up ATF level =>Page 38 .

6.8 - Dismantling and assembling planetary gearbox

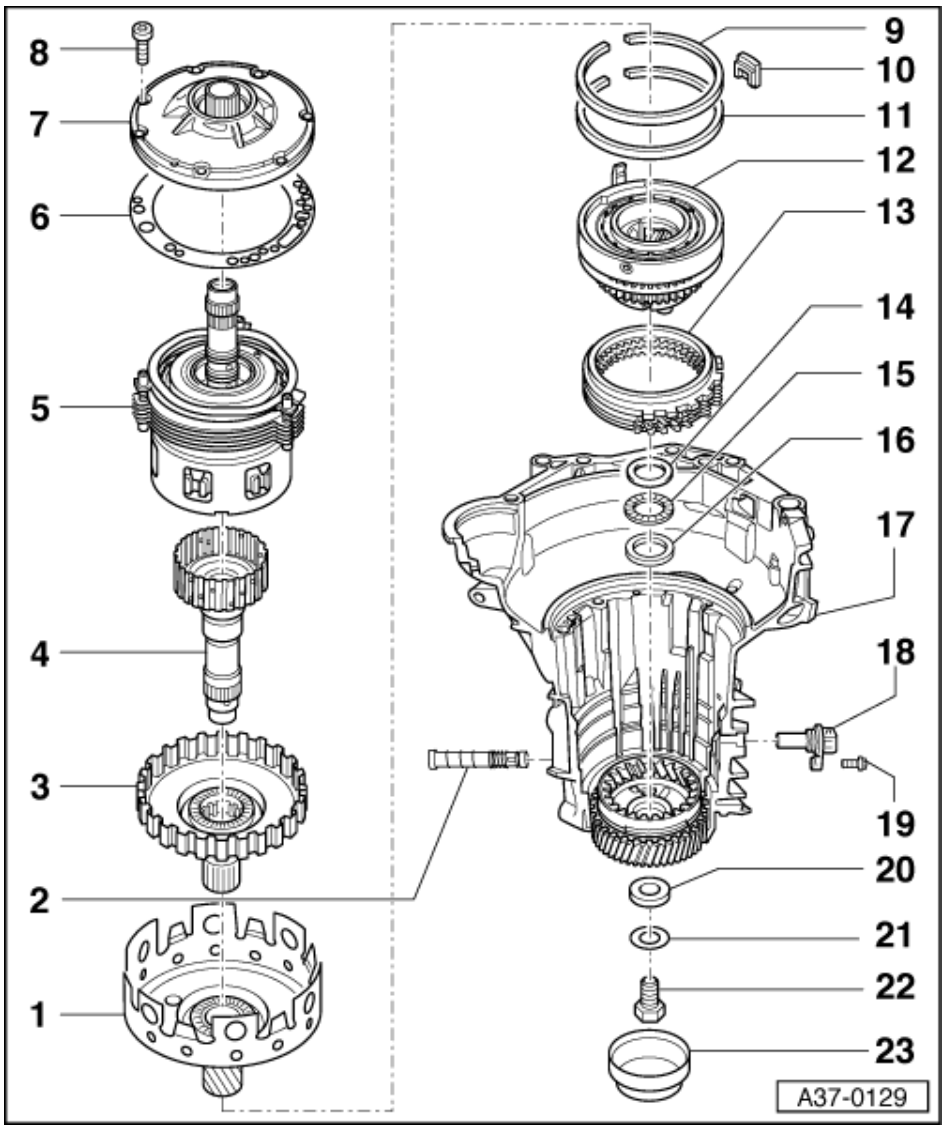
6.9 - Dismantling planetary gearbox - overview

Notes:

- An exchange component containing all the selector elements and the valve body is available for repairing automatic gearbox 01N .
- Select the correct exchange component according to the gearbox code letters=>from Page 2 .
- Fitting instructions:

=> Special information; Transmission; No. 10

- Order of removal: Item 2 , 19 , 18 , 23 , 8 , 7 , 6 , 5 , 22 , 21 , 20 , 4 , 3 , 1 , 9 , 10 , 11 , 12 , 13 , 14 , 15 , 16 .



1 Large sun gear
- Pull up and out

2 Sealing plug
- Take out before removing the free wheel => Removing valve body, Page 141

3 Large input shaft
- Lift up and out

4 Small input shaft
- To remove, unscrew bolt -Item 22 -
- Pull up and out

5 Assembly
- With 3rd and 4th gear clutch -K3- with turbine shaft
- With 1st to 3rd gear clutch -K1-
- With reverse gear clutch -K2-
- With 2nd and 4th gear brake -B2-
- With supporting tube for -B2-
- Lift up and out together at the turbine shaft

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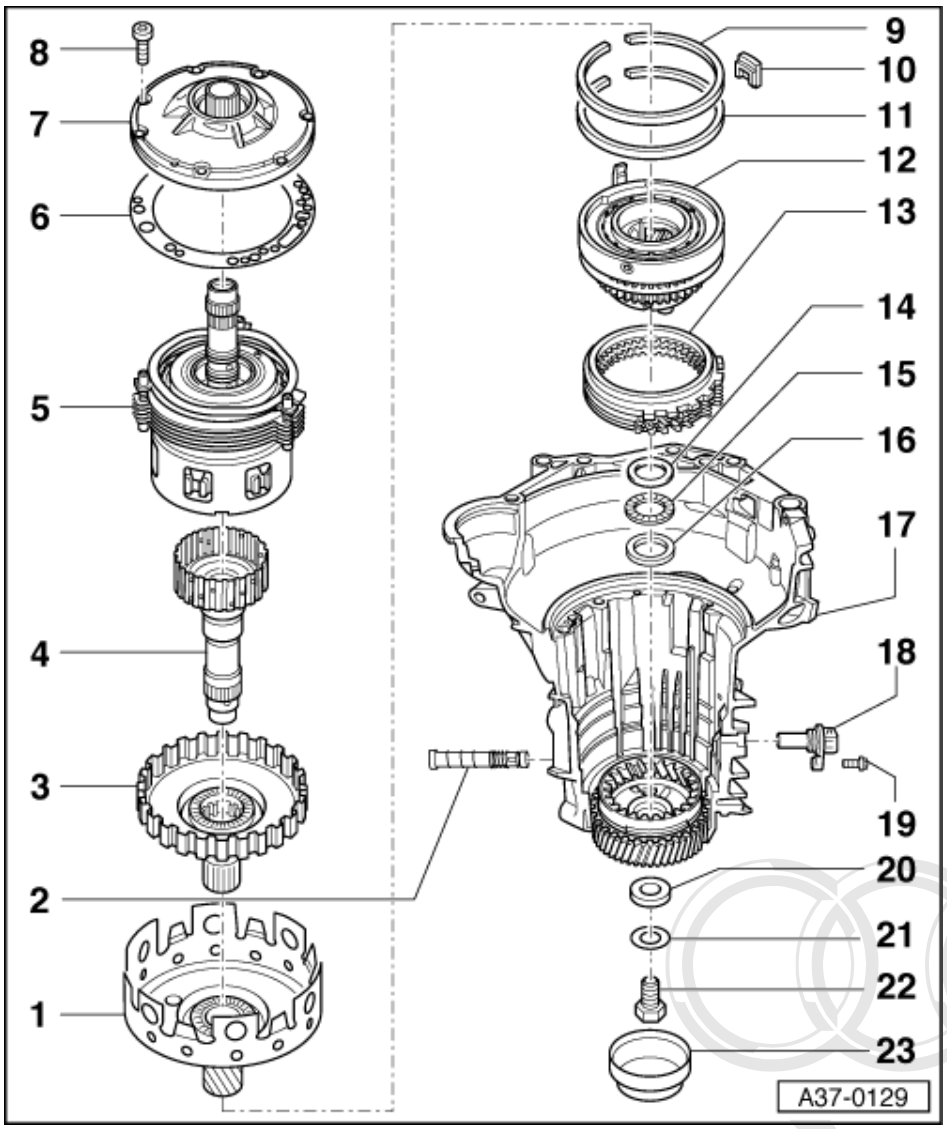

6 Gasket
- Take off

7 ATF pump
- To remove, unscrew all the bolts -Item 8 -
- To press off the pump, screw two M8 bolts evenly into the two threaded holes

8 Bolt
- For ATF pump

9 Circlip
- For supporting tube for -B2-
- Lift out

10 Baffle block
- Remove after lifting out circlip, -Item 9 -

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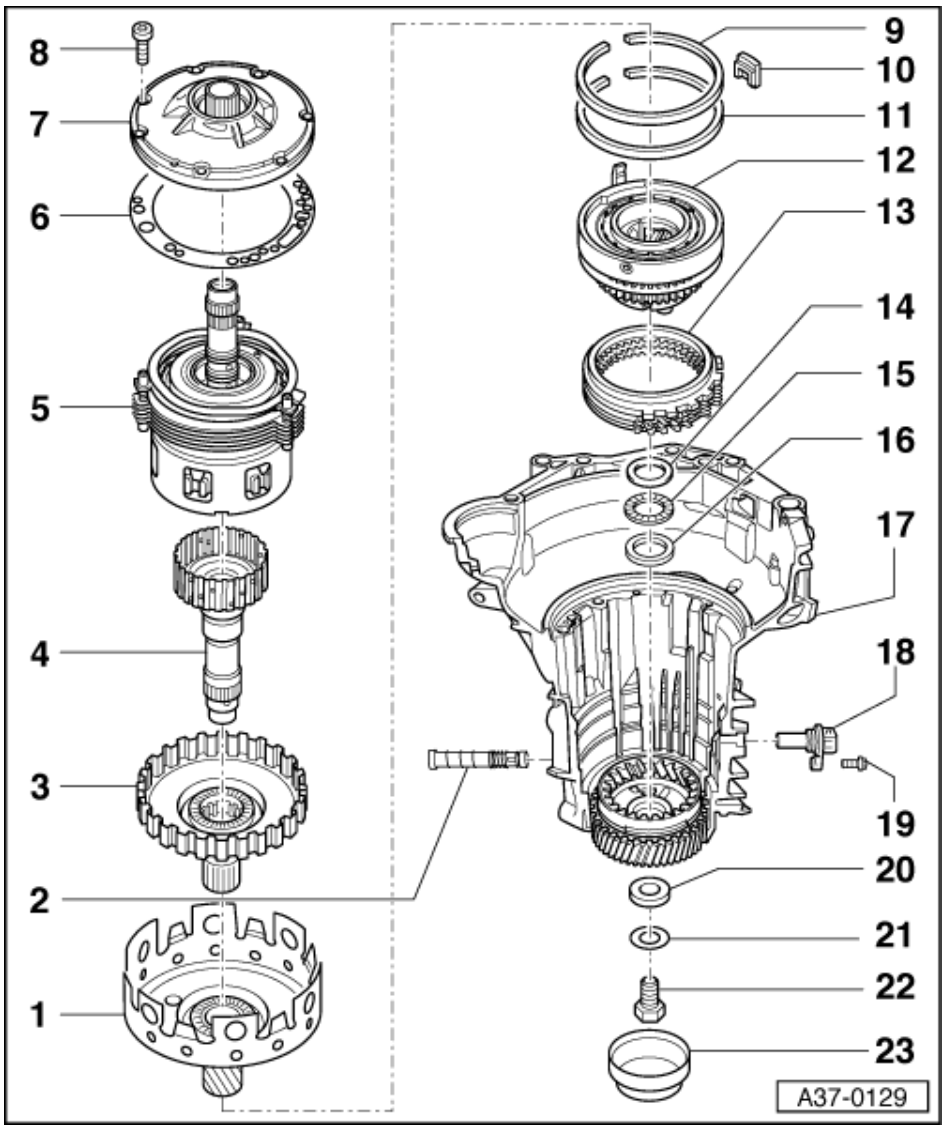

11 Circlip

- For free wheel
- Lift out

12 Free wheel

- With planet carrier
- Before removing free wheel, remove valve body and sealing plug -Item 59 and remove gearbox speed sender -G38, Item 18

13 Reverse gear brake -B1-

- Remove pressure plate together with plates and shim(s) from the top

14 Washer for axial needle bearing

- Take off

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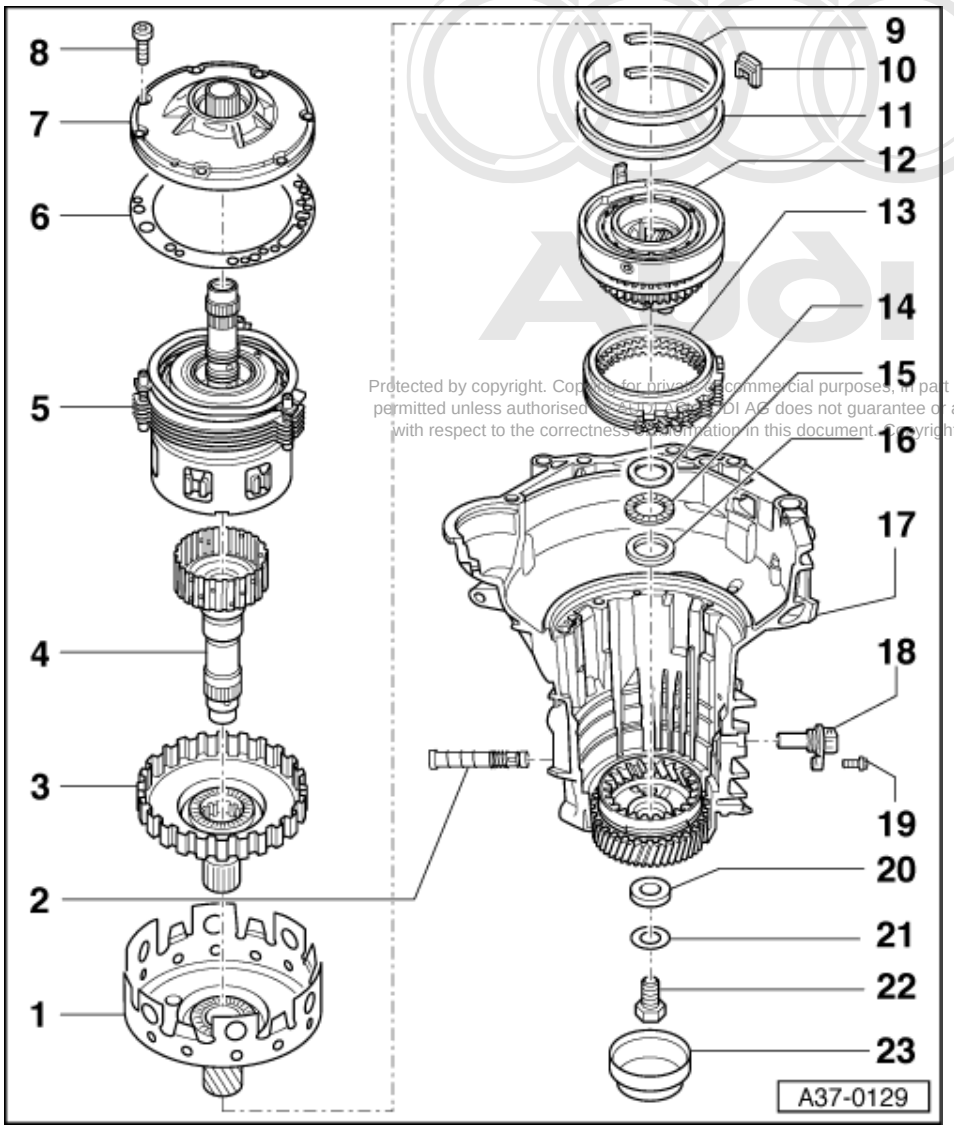

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15 Axial needle bearing

- Take off

16 Washer for axial needle bearing

- Take off

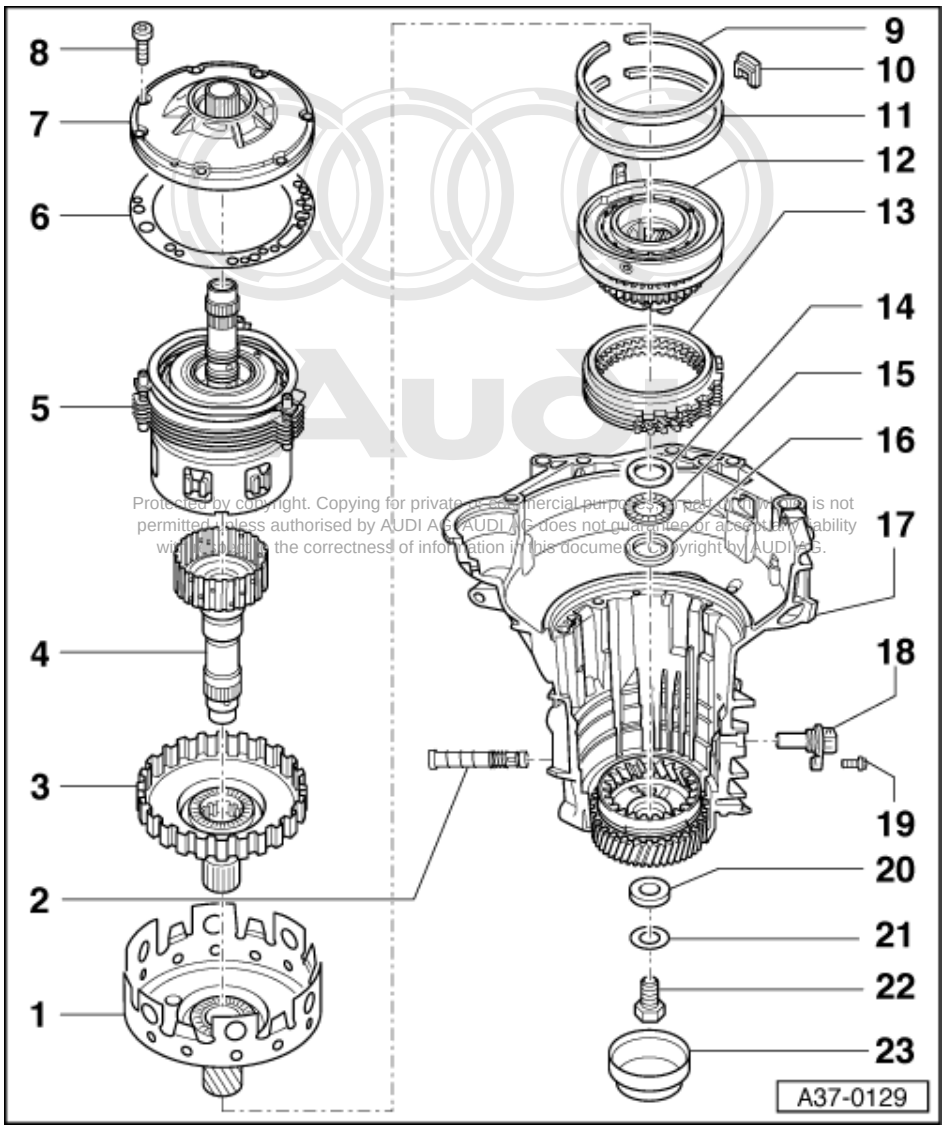
17 Gearbox housing with input gear

- Input gear does not have to be removed when dismantling planetary gearbox
- Removing and installing input gear
  => Page 161

18 Gearbox speed sender -G38

- Take out before removing the free wheel

19 Screw



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20 Shim for planet carrier

- Take off after slackening the bolt -Item 22 -

21 Washer

- Take off after slackening the bolt -Item 22 -

22 Bolt

- For small input shaft
- Unscrew to remove

23 Sealing cap

- Knock out with chisel
- Cannot be removed without being damaged

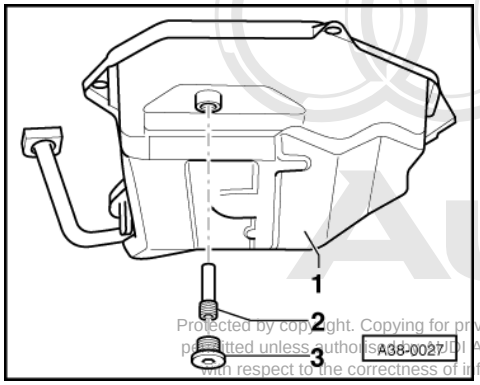
6.10 - Dismantling planetary gearbox

Special tools, testers and auxiliary items

- Holding plate - VW 309
- Support clamp - VW 313
- Gearbox support - VW 353
- 2 M8 bolts
- Drip tray

- Oil extractor V.A.G 1358 A and oil suction probe V.A.G 1358/A 1 (only for vehicles with 6-cylinder engine).

Vehicles with 4-cylinder engine:



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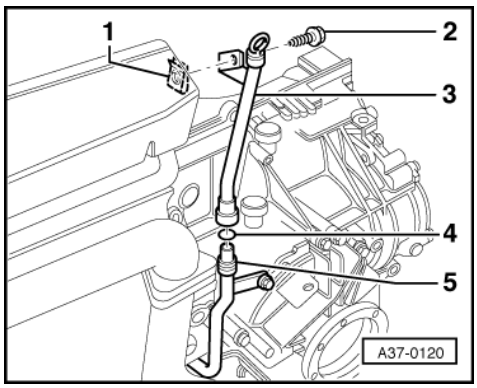
- -> Unscrew ATF inspection plug -3- and overflow pipe -2- (5 mm hexagon socket).
- Drain ATF.

Vehicles with 6-cylinder engine



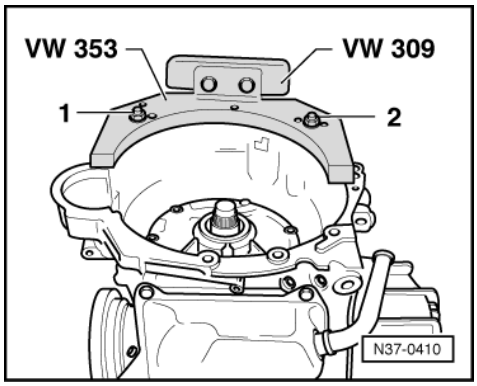
- Draw off ATF using oil extractor V.A.G 1358 A and oil suction probe V.A.G 1358/A 1.

or

- -> Unscrew union nut -5- at lower ATF filler pipe, pull filler pipe out of oil pan and drain off ATF.

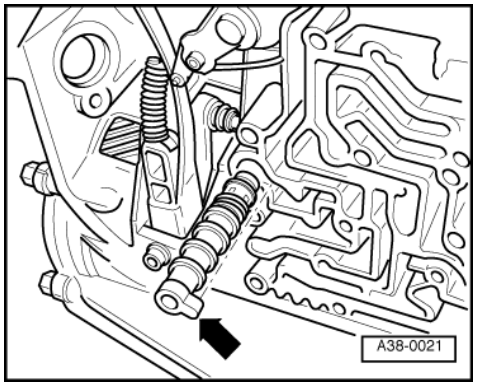
All models

- Remove gearbox => Page 25 .
- Take out torque converter.



- -> Secure gearbox to assembly support with bolts -1- and -2-.

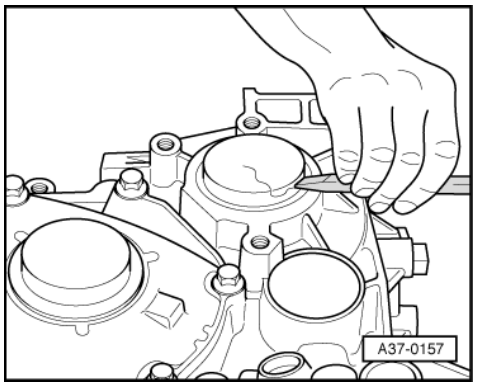
- Remove valve body => Page 141 .



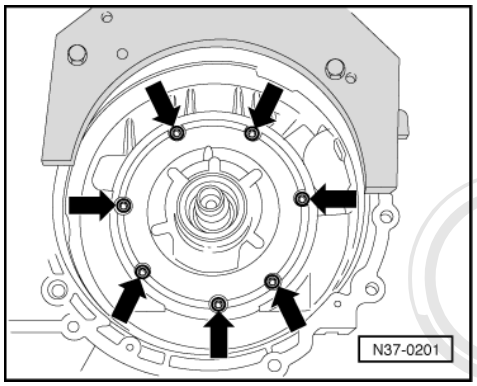
- -> Take out sealing plug -arrow-.
- Remove gearbox speed sender -G38=>Page 146 .

Note:

The sealing plug and gearbox speed sender must be removed to prevent them from being damaged.



- -> Remove sealing cap.



- -> Remove ATF pump bolts (arrows).

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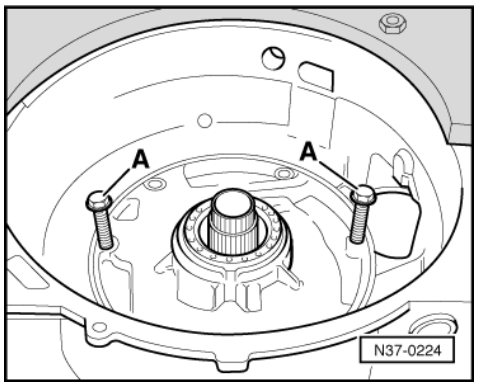
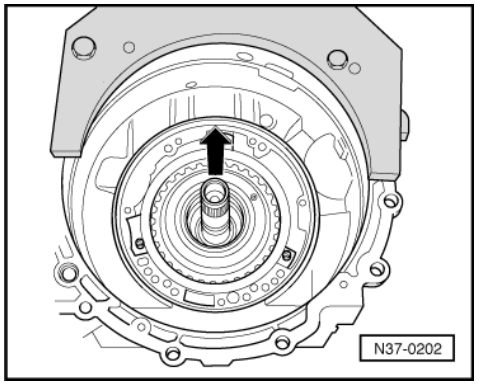
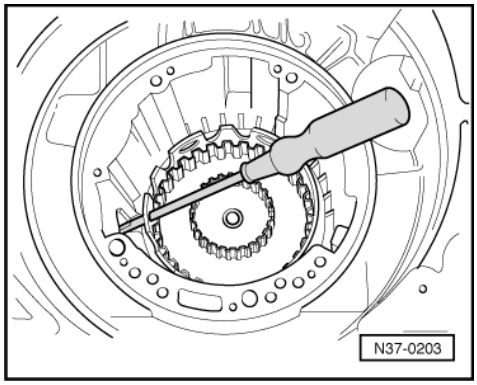


- -> To remove ATF pump screw in two M8 bolts -A- into the tapped holes of the ATF pump.
- Tighten the bolts -A- evenly to press ATF pump off gearbox housing and remove.
- Remove gasket, retaining ring and shim



- -> Take hold of turbine shaft and pull out all the clutches together with supporting tube for -B2-, -B2- plates, springs and spring caps -arrow-.



- Engage parking lock.
- -> To slacken the bolt for the small input shaft, insert a screwdriver through one of the holes of the large sun gear.

Note:

If it is not possible to engage the parking lock, use a second screwdriver to hold the large input shaft.

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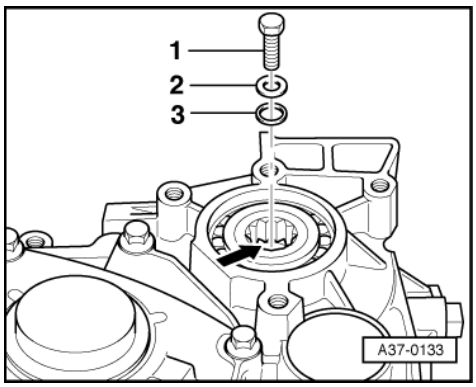
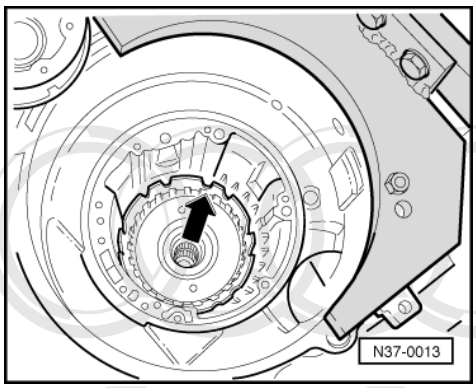


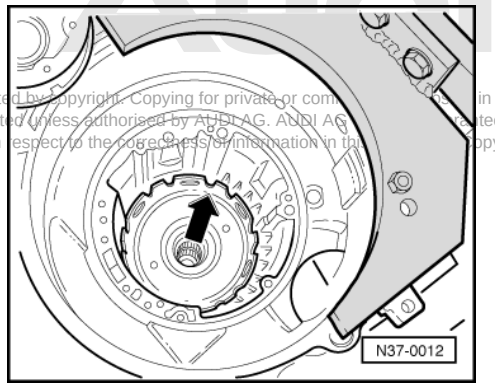
- -> Loosen bolt -1- for "small input shaft".
- Remove bolt with washer -2- and shim -3- for "small input shaft".
- Pull out small input shaft.

Note:

The axial needle bearing for the planet carrier remains in the gearbox/input gear.



- -> Pull out large input shaft (arrow).



- -> Pull out large sun gear (arrow).

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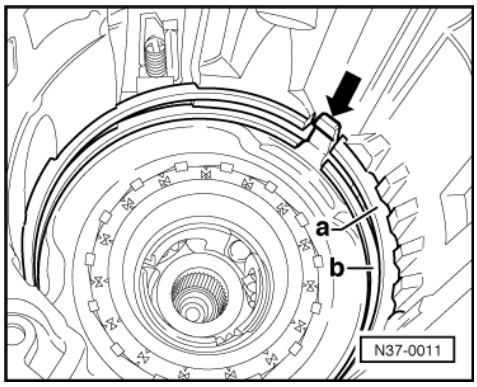
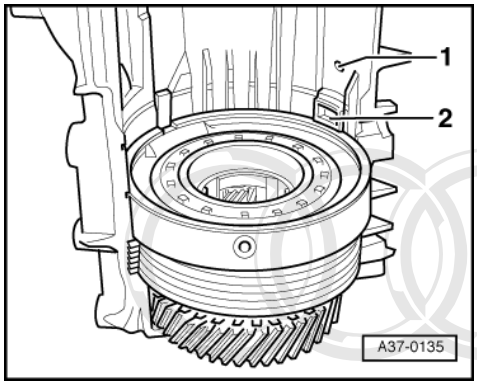


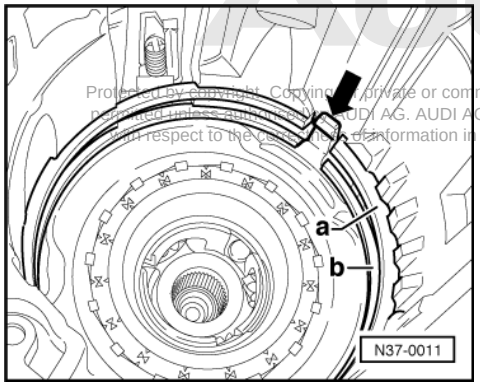
Note:

Before removing the free wheel remove the gearbox speed sender -G38 and the sealing plug.

- -> Remove circlip -a- for supporting tube for -B2-.



- -> Pull off baffle block -2-.



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- -> Remove free wheel circlip -b-.
- Take hold of the inside of the planet carrier and pull it out together with free wheel and dished washer.
- Remove pressure plate, plates and shim(s) of the reverse gear brake -B1-.
- Take off axial bearing and washers.

Note:

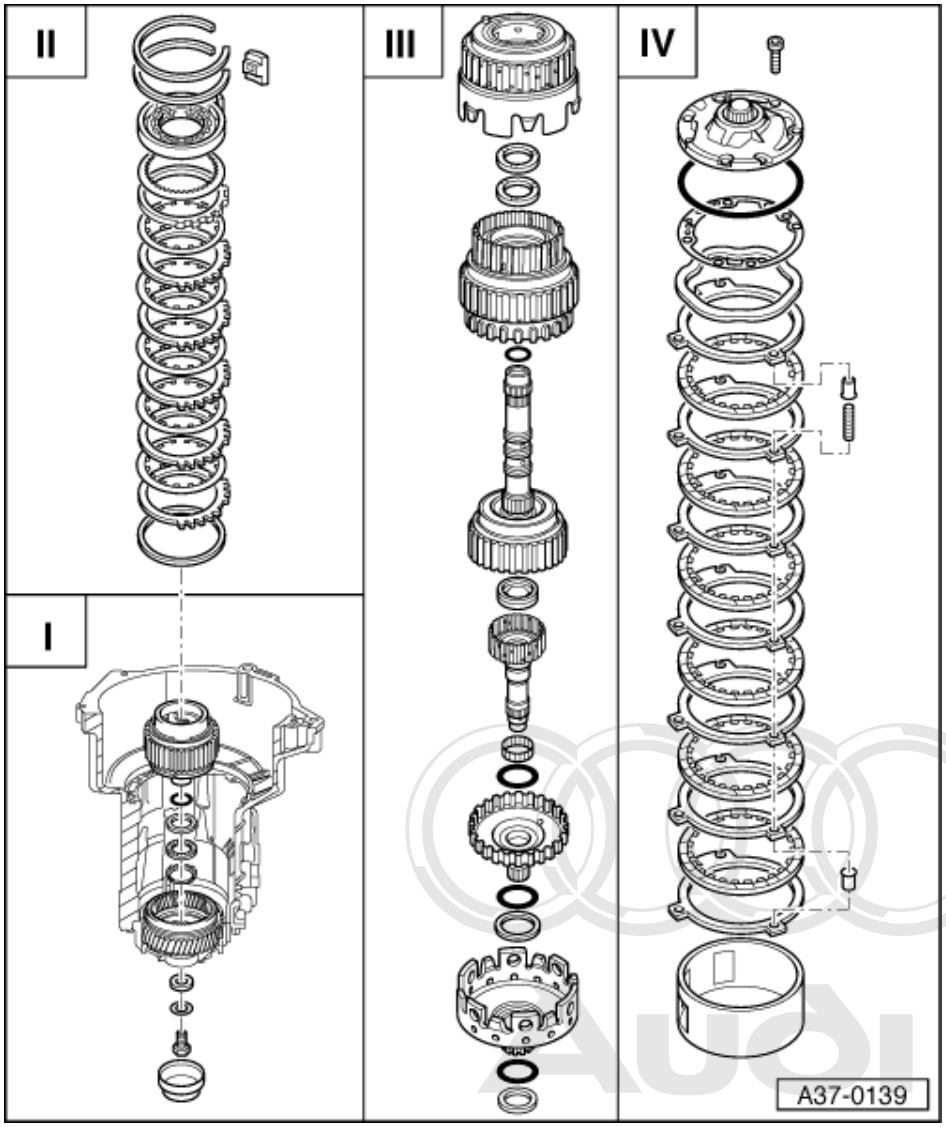
Assembling planetary gearbox => Page 65 .

6.11 - Assembling planet carrier - overview

Notes:

- An exchange component containing all the selector elements and the valve body is available for repairing automatic gearbox 01N .
- Select the correct exchange component according to the gearbox code letters=>from Page 2 .
- Fitting instructions:

=> Special information; Transmission; No. 10



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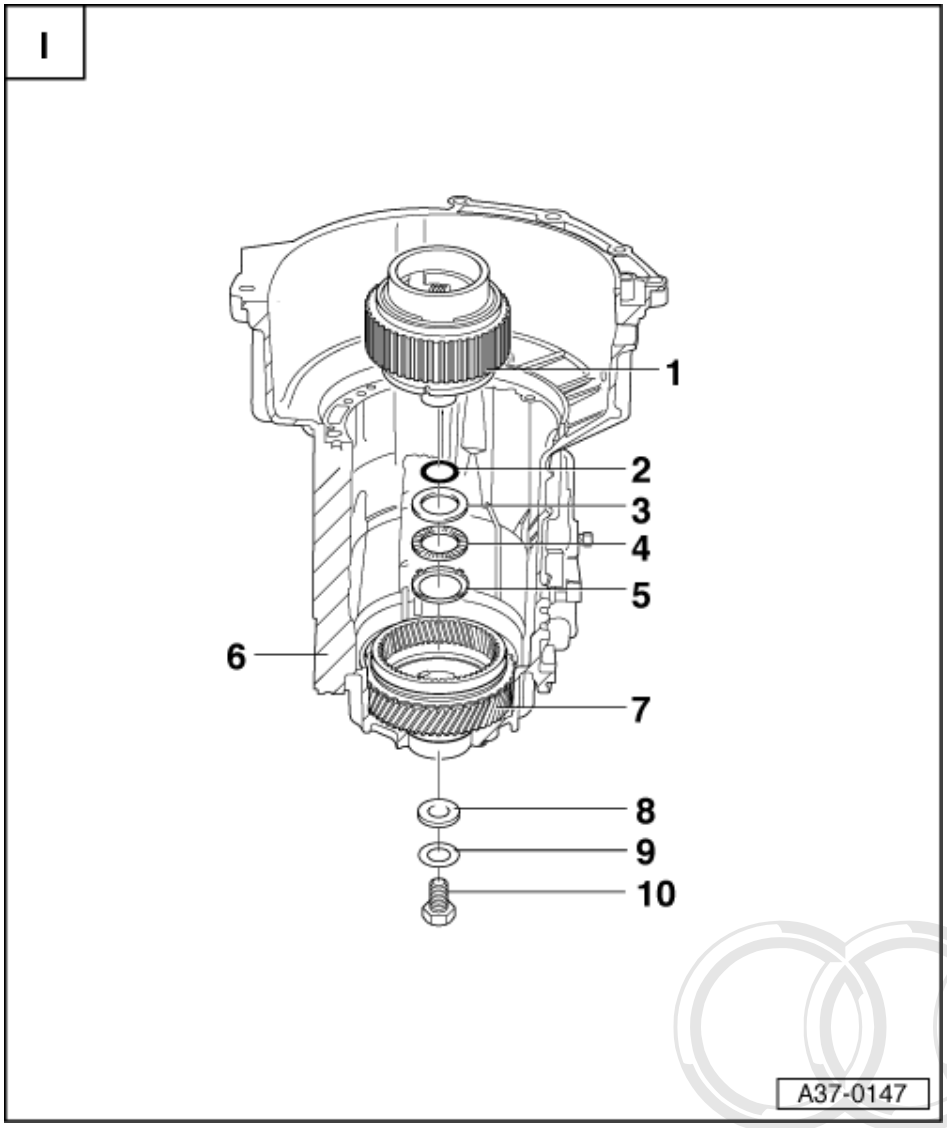
I - Installing planet carrier => Page 66

II - Installing components from reverse gear brake -B1- up to circlip for -B2- supporting tube => Page 68

III - Installing components from large sun gear up to reverse gear clutch -K2- => Page 71

IV - Installing components from supporting tube for -B2- up to ATF pump=>Page 75

6.12 - I - Installing planet carrier



=> Overview, Page 54

Note:

Assembling planetary gearbox

=>Page 78 .

1 Planet carrier
- Adjusting => Page 87

2 O-ring
- Renew
- Insert in planet carrier

3 Axial needle bearing washer

4 Axial needle bearing

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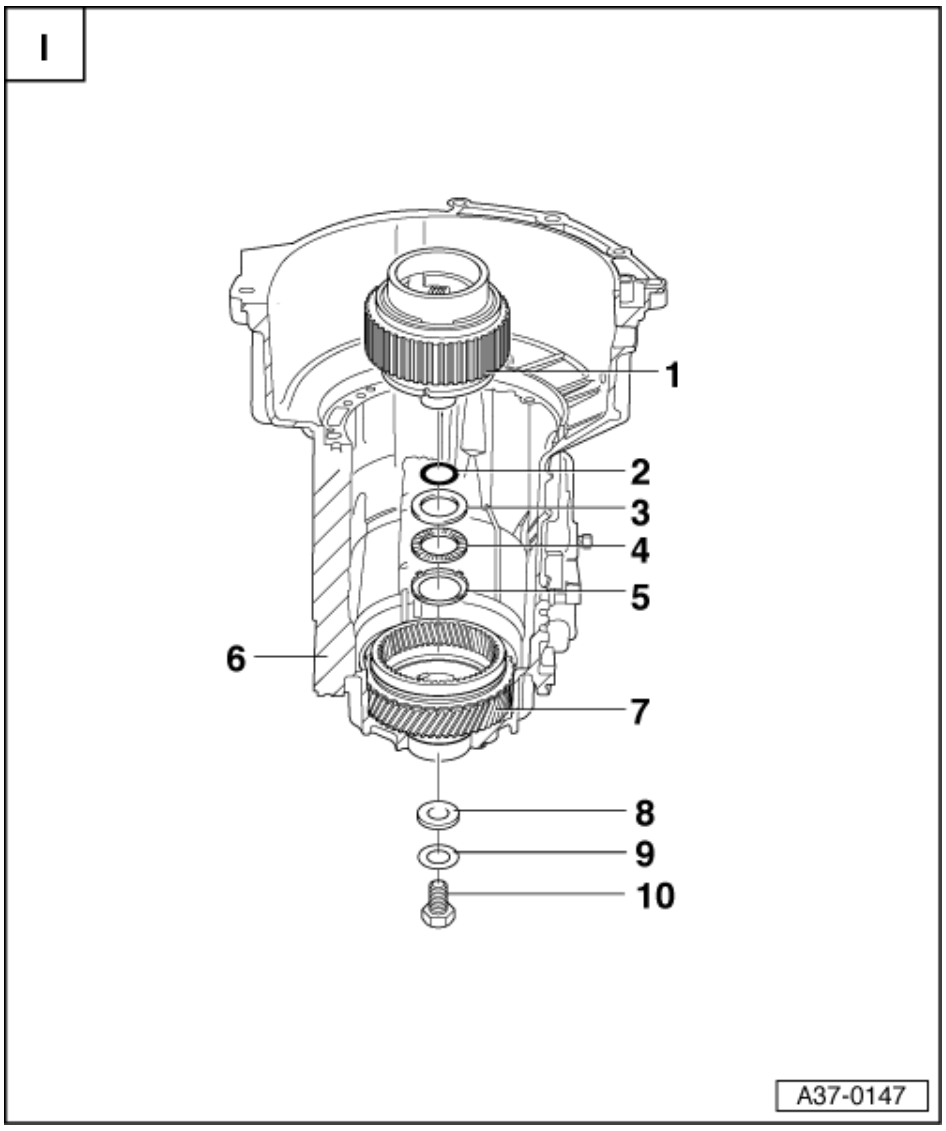

5 Axial needle bearing washer
- Install with smooth side facing toward input gear

6 Gearbox housing with input gear installed

7 Input gear
- Do not remove to dismantle planetary gearbox
- Removing and installing
  => Page 161

8 Planet carrier shim
- Determining thickness, => Adjusting planet carrier, Page 87

9 Washer

10 Bolt - 30 Nm
- For small input shaft

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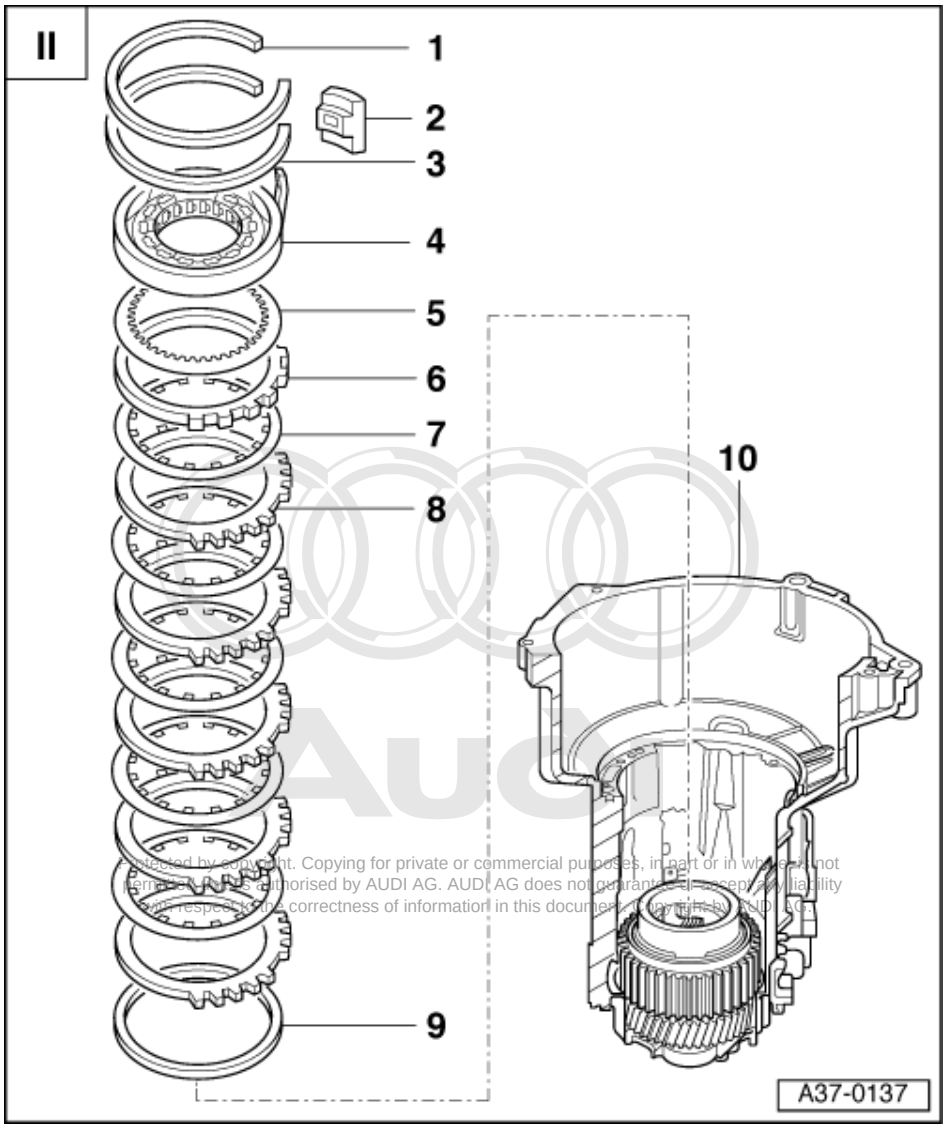
6.13 - II - Installing components from reverse gear brake -B1- up to circlip for -B2- supporting tube



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=> Overview, Page 54

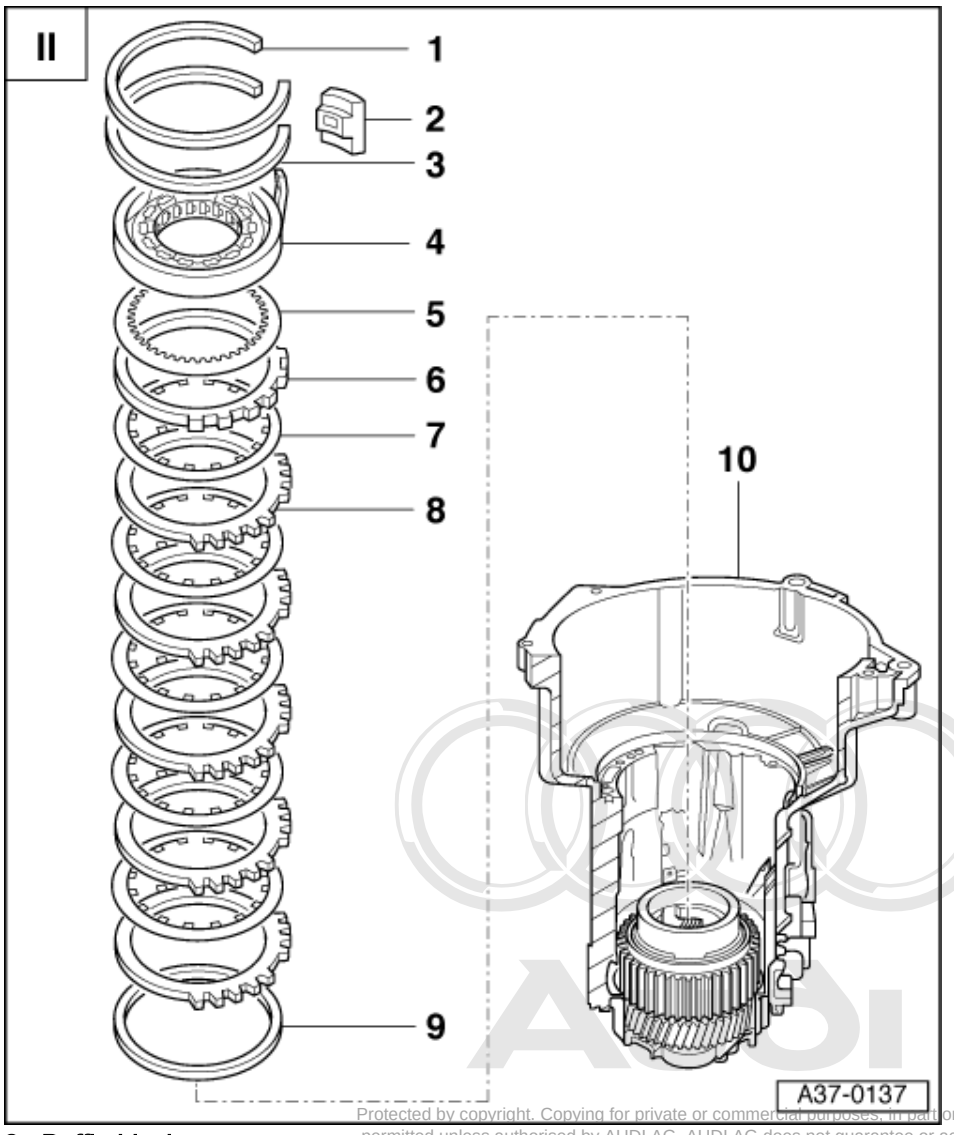
Note:

Assembling planetary gearbox

=>Page 78 .

1 Circlip

- For supporting tube -B2-
- Insert baffle block before fitting circlip
- Installation position: Circlip open ends faces free wheel retaining wedge



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2 Baffle block

- Insert before inserting circlip (item1)

3 Circlip

- For free wheel
- Installation position: open ends of circlip face toward retaining wedge of free wheel

4 Free wheel with -B1- piston

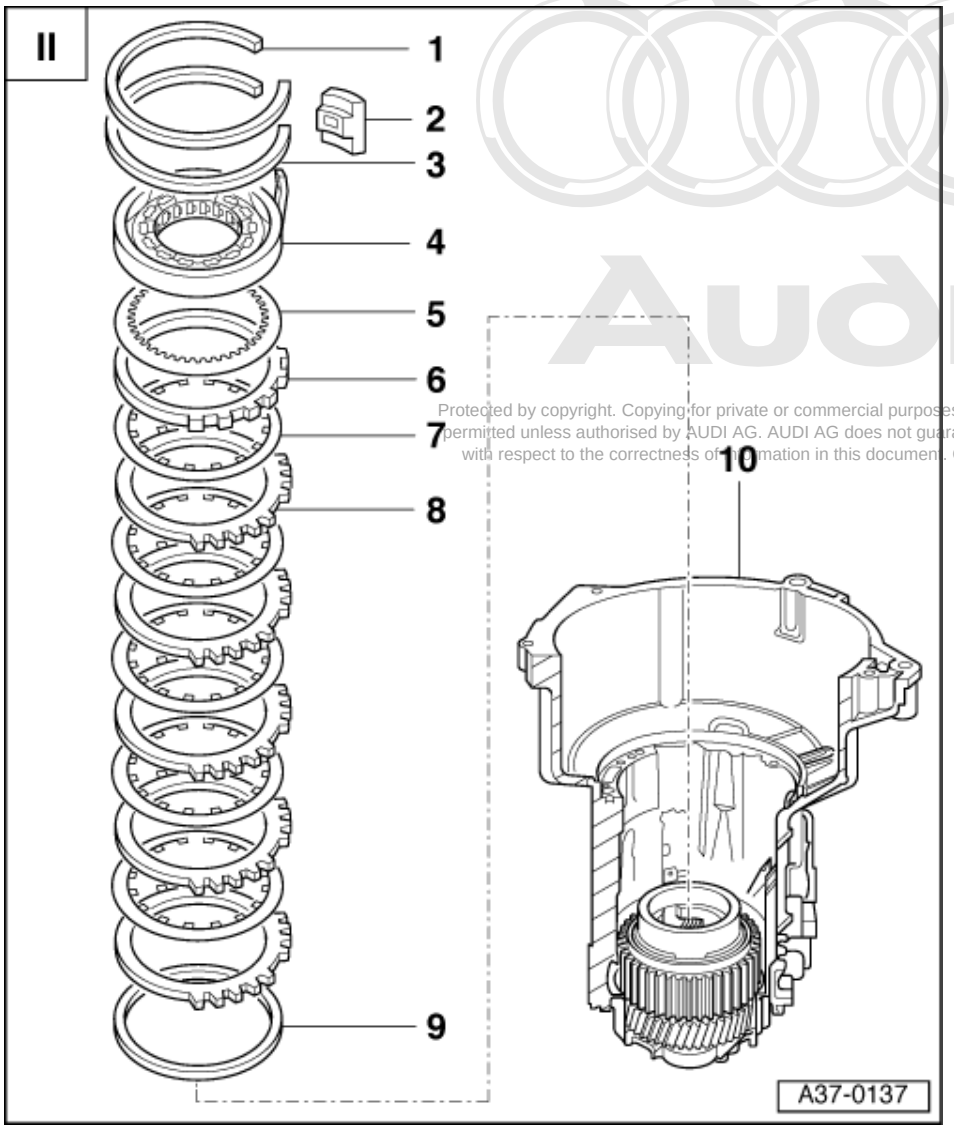
- Dismantling and assembling
  => Page 113
- Use assembly ring 3267 for installing

5 Dished spring

- Install with convex side facing free wheel

6 Pressure plate -B1-

- Install with flat side facing toward plates
- Spare part is allocated according to gearbox code letters



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7 Inner plate, -B1-

- Quantity of inner plates -B1- =>from Page 2
- Soak new inner plates in ATF for 15 minutes before installing

8 Outer plate, -B1-

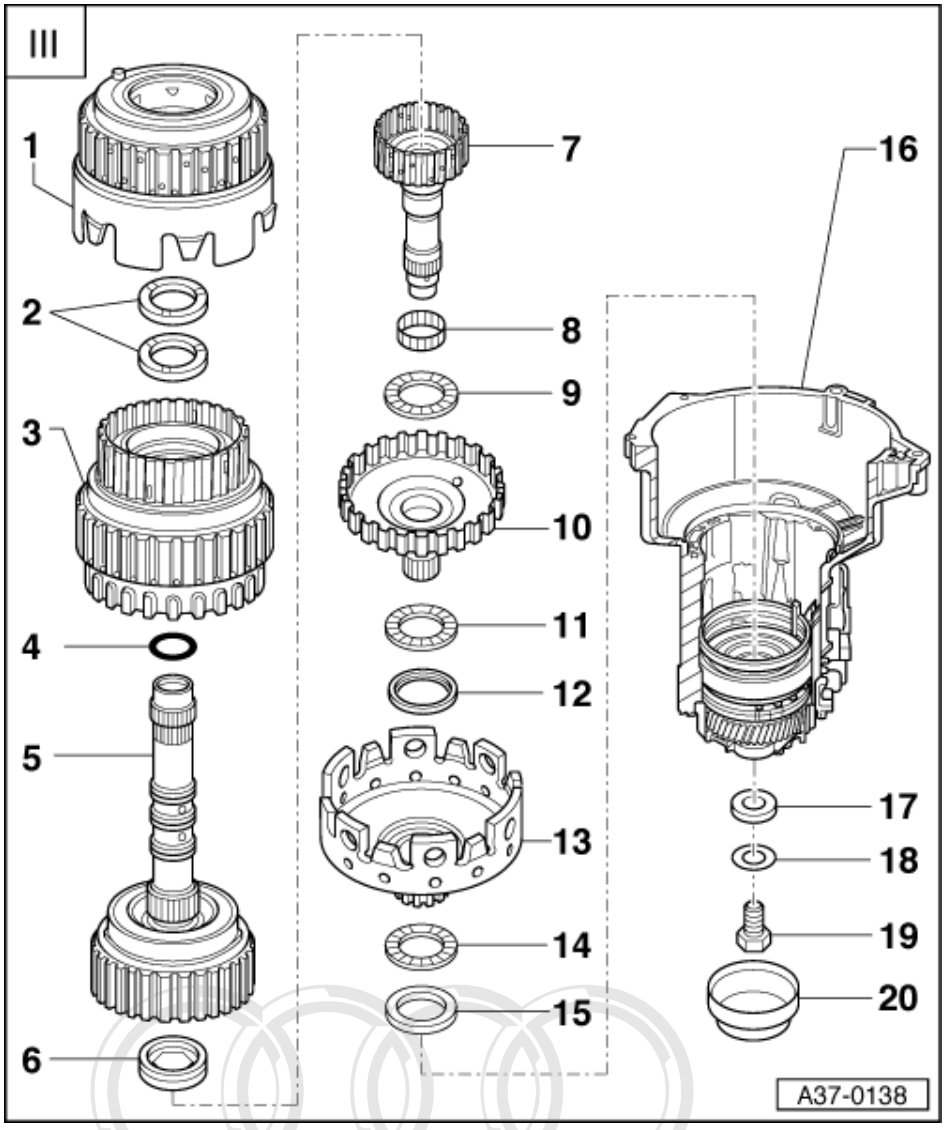
- Quantity of outer plates -B1- =>from Page 2

9 Shim

- Determining thickness
  => Adjusting reverse gear brake -B1-, Page 93
- 1 or 2 shims can be installed

10 Gearbox housing with planet carrier installed

6.14 - III - Installing components from large sun gear up to reverse gear clutch -K2-



=> Overview, Page 54

Note:

Assembling planetary gearbox

=>Page 78 .

1 **Reverse gear clutch -K2-**
- When installing, rotate clutch until all the inner plates have meshed
- Dismantling and assembling
  =>Page 122

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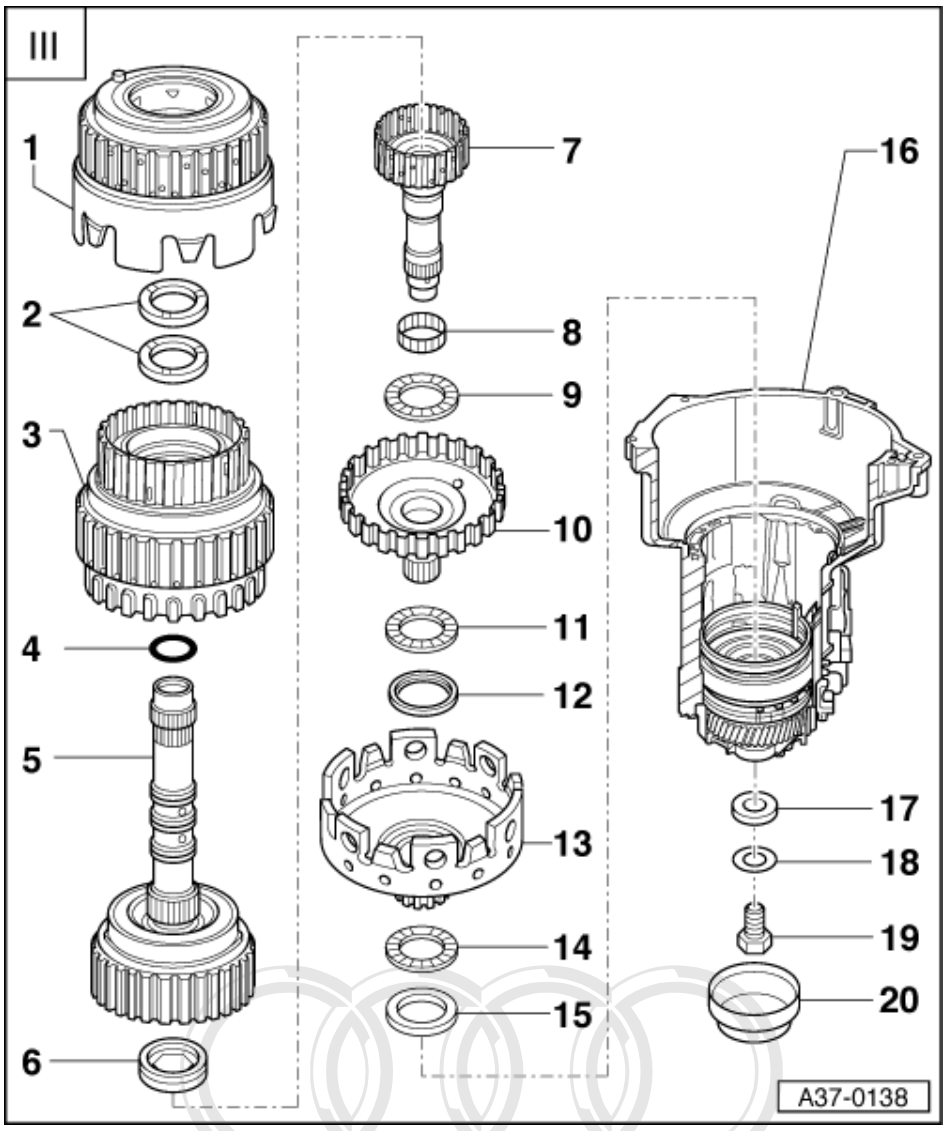

2 Shim

- Determining thickness
  => Adjusting clutch play between -K1- and -K2-, Page 98
- 1, 2 or 3 shims can be installed

3 1st to 3rd gear clutch -K1-

- Dismantling and assembling
  => Page 116

4 Seal

- Renew

5 3rd and 4th gear clutch -K3- with turbine shaft

- When installing, rotate clutch until all the inner plates have meshed
- Dismantling and assembling
  => Page 126

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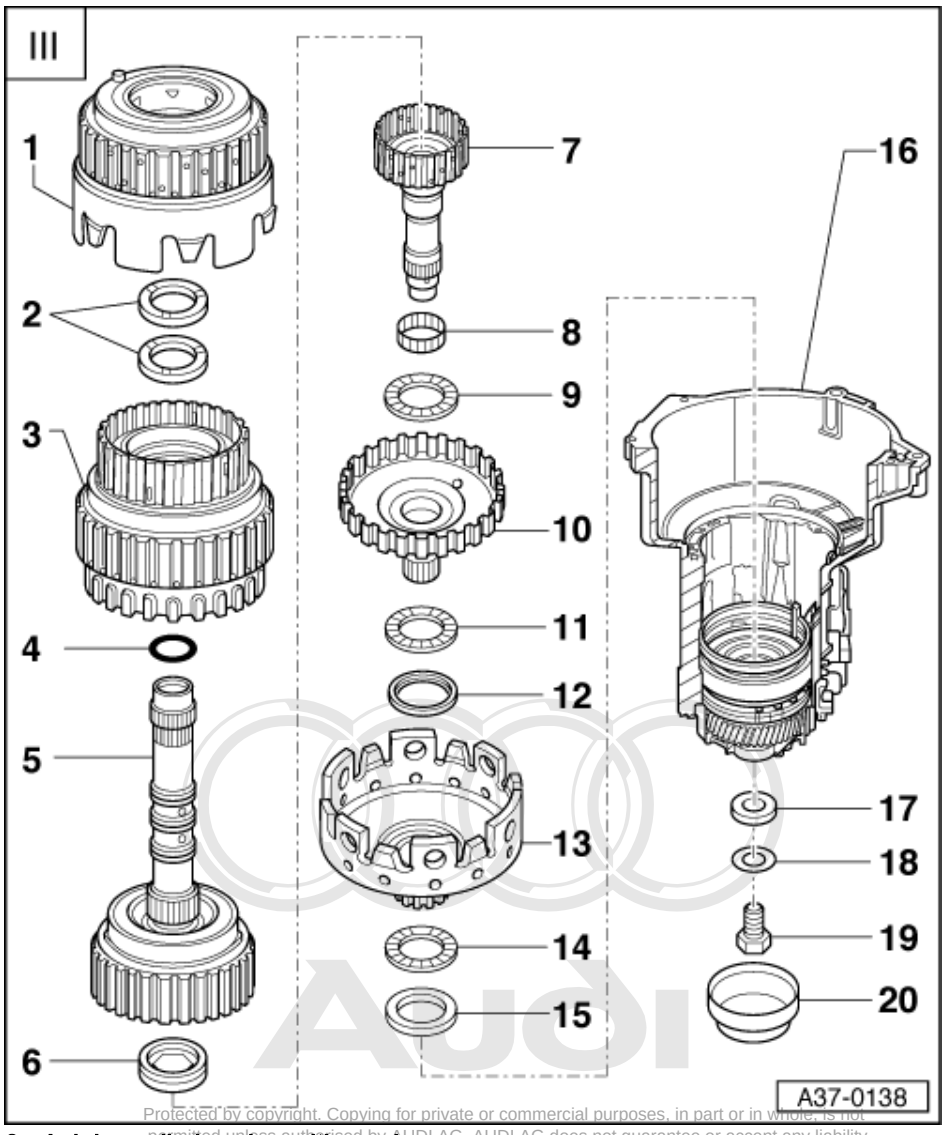

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6 Axial needle bearing with washer
- Lightly lubricate washer with ATF so that bearing sticks to 3rd and 4th gear clutch
- Install axial needle bearing facing toward small input shaft

7 Small input shaft

8 Needle bearing

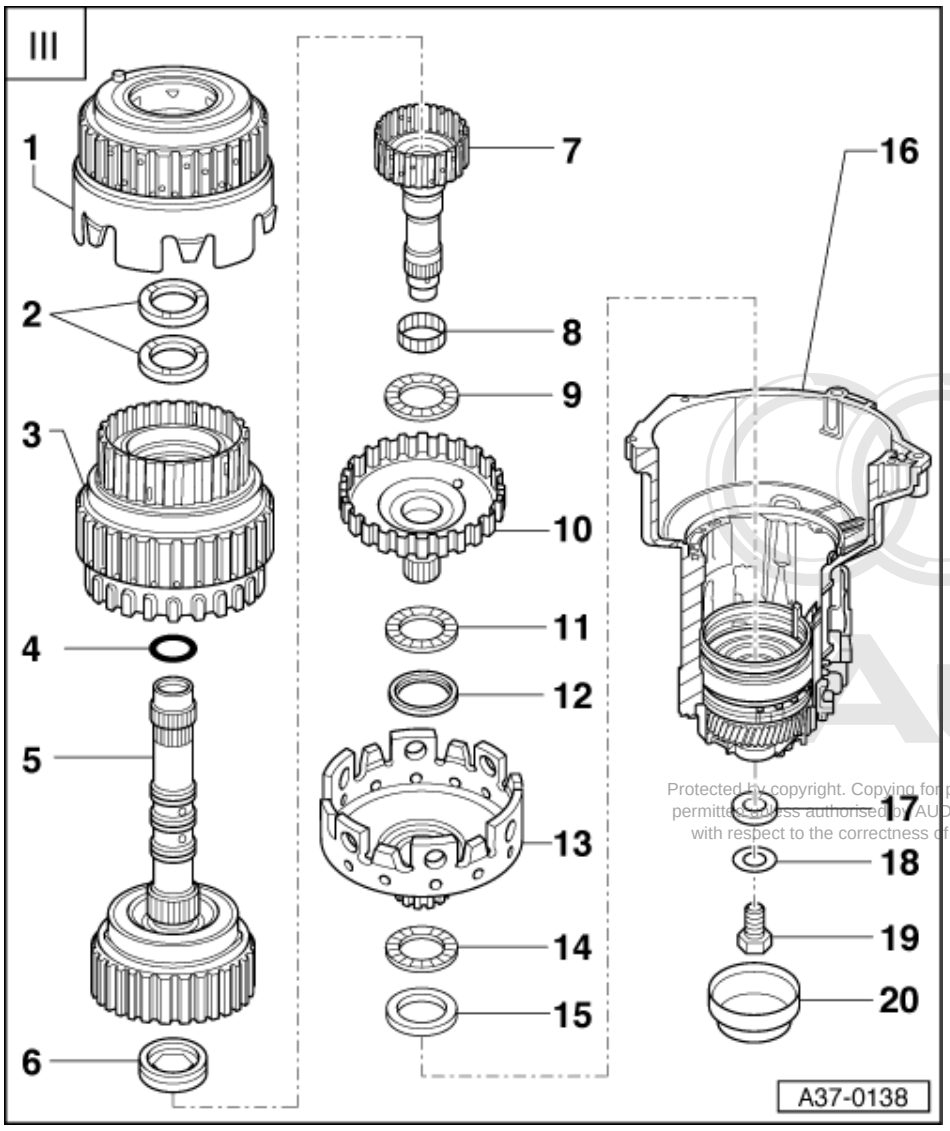
9 Axial needle bearing

10 Large input shaft

11 Axial needle bearing

12 Axial needle bearing washer
- With shoulder
- Installation position: Shoulder faces toward large sun gear

13 Large sun gear



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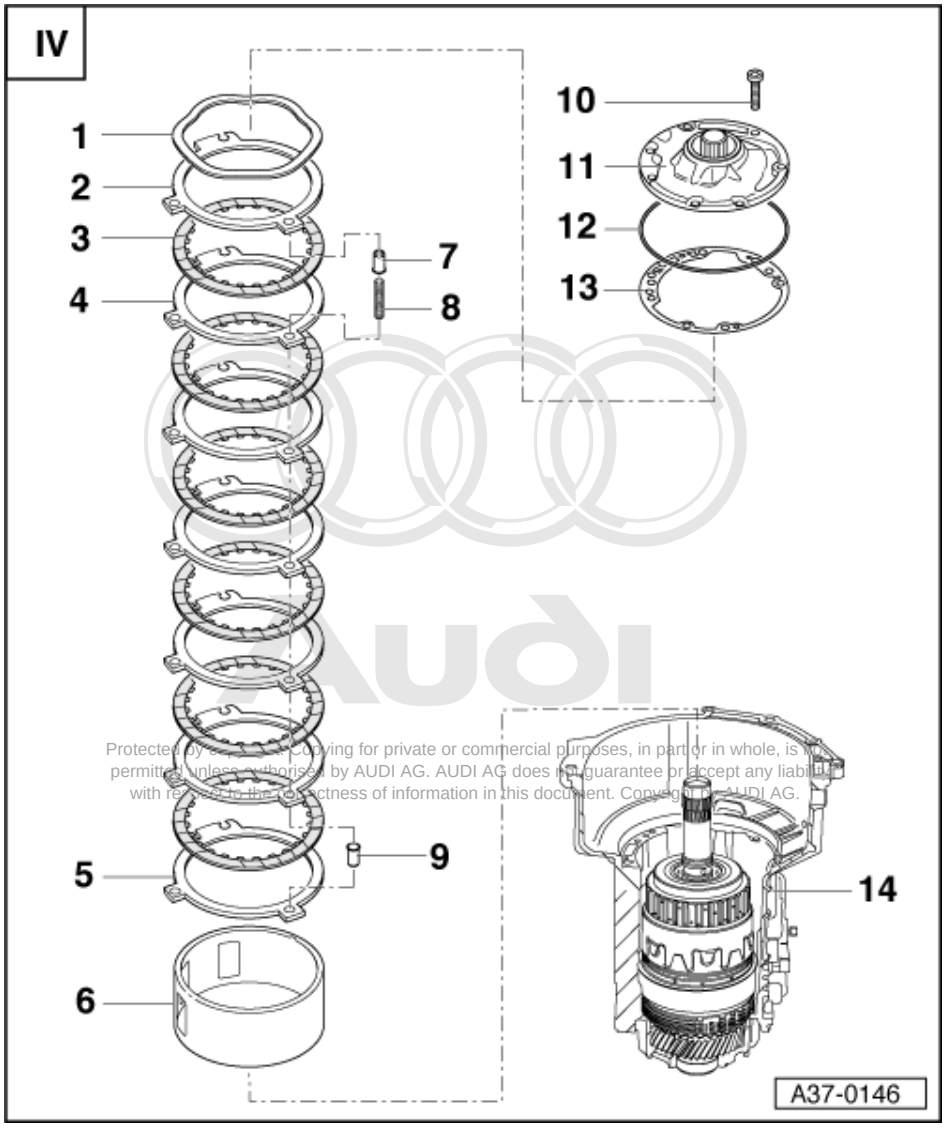
14 Axial needle bearing
15 Axial needle bearing washer
16 Gearbox housing with free wheel and circlips installed
17 Planet carrier shim
- Determining thickness, => Adjusting planet carrier, Page 87

18 Washer
19 Bolt - 30 Nm
- For small input shaft

20 Sealing cap
- Drive in with fitting sleeve 40-20

6.15 - IV - Installing components from supporting tube for -B2- up to ATF pump



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=> Overview, Page 54

Note:

Assembling planetary gearbox

=>Page 78 .

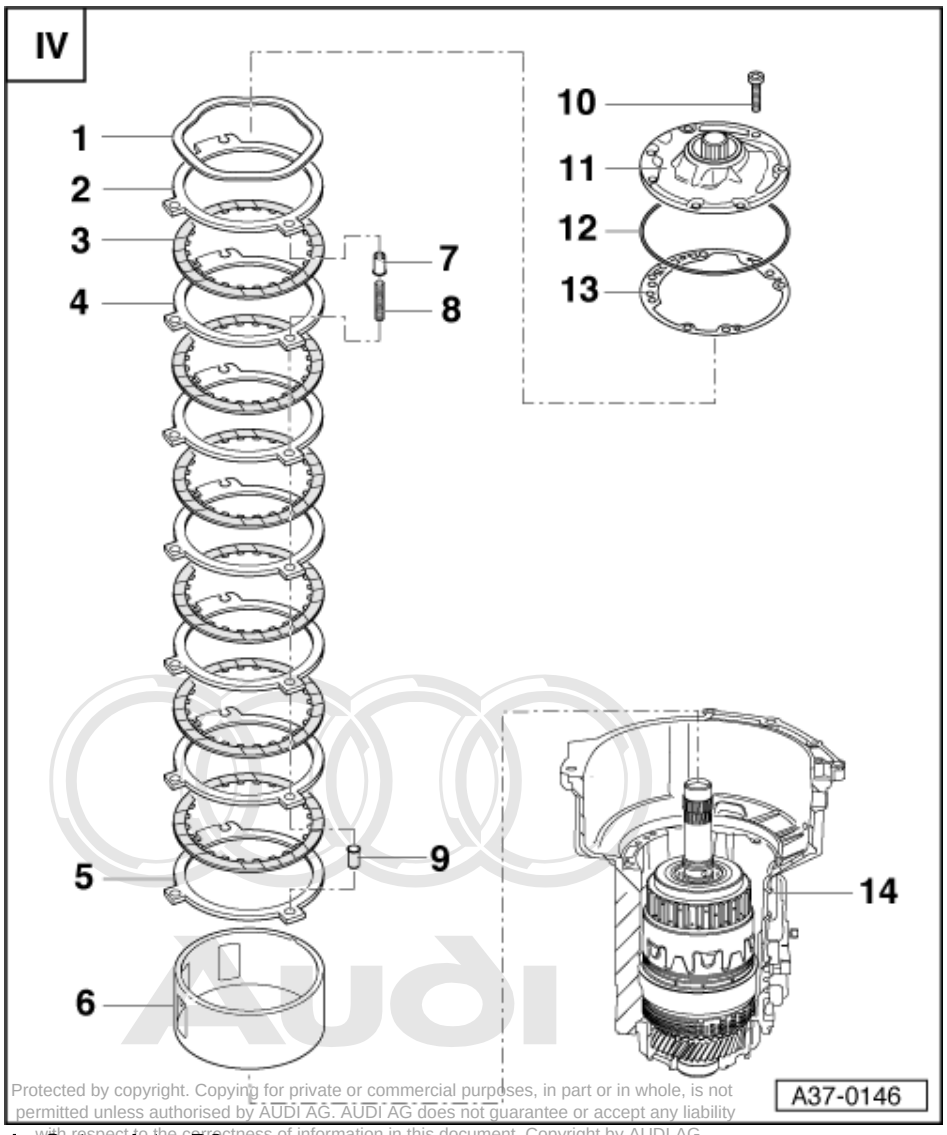
1 Corrugated washer

2 Outer plate -B2-

- Quantity => from Page 2
- Calculating thickness of outer plate=>Adjusting 2nd and 4th gear brake -B2-, Page 102
- 1 or 2 outer plates may be installed.

3 Inner plate -B2-

- Quantity => from Page 2
- Soak new inner plates in ATF for 15 minutes before installing



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4 Outer plate -B2-

- Always install 2 mm thick outer plates
- Quantity => from Page 2

5 Outer plate -B2-

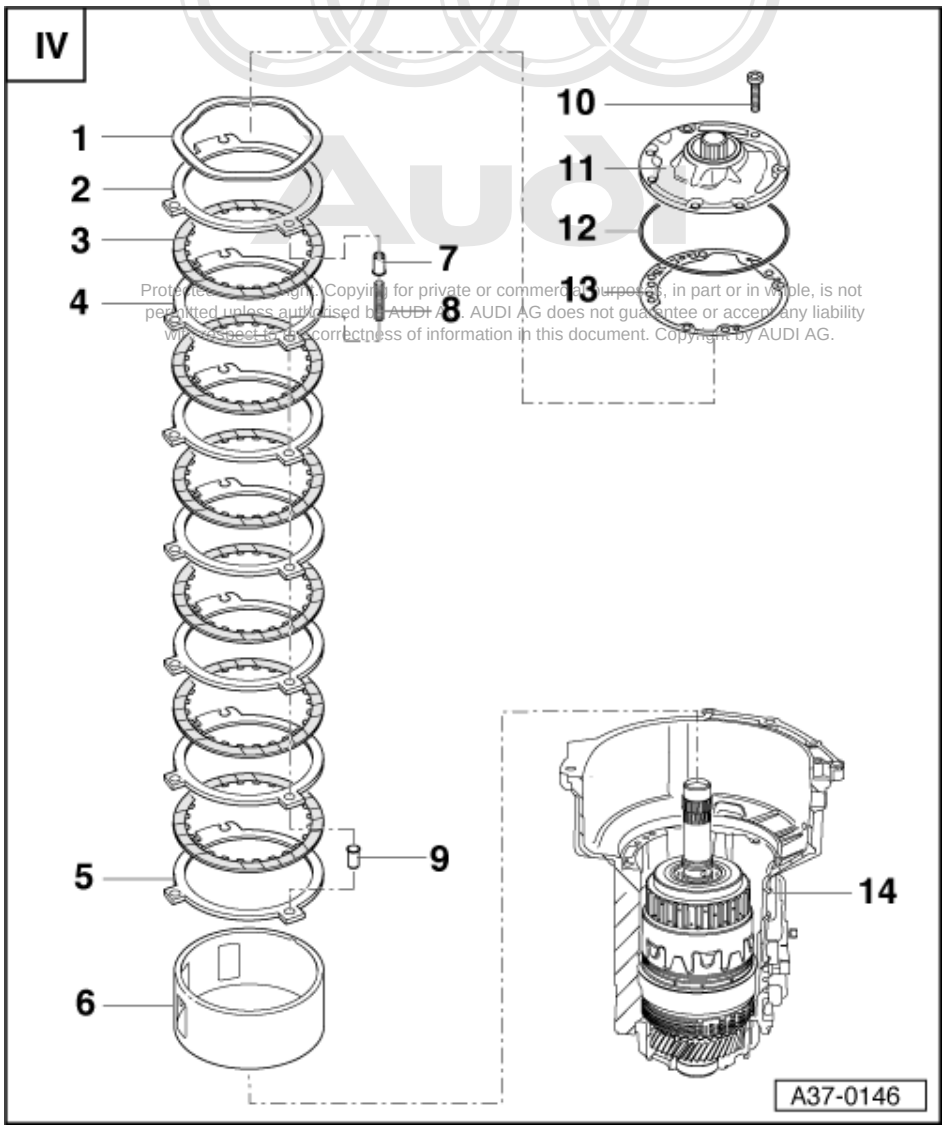
- Fit 3 mm thick outer plate to supporting tube -B2-

6 Supporting tube -B2-

- For the -B2- plate set
- Insert so that bottom groove engages on wedge of free wheel
- As a replacement part it is allocated according to gearbox code letters

7 Spring cap

- Install spring caps before installing last outer plate



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8 Spring

9 Spring cap

- Install spring caps after installing first outer plate

10 Bolt

- Tighten to 8 Nm and turn 90° further
- The turning further of 90° may be done in several stages

11 ATF pump with piston -B2-

- Dismantling and assembling
  => Page 109

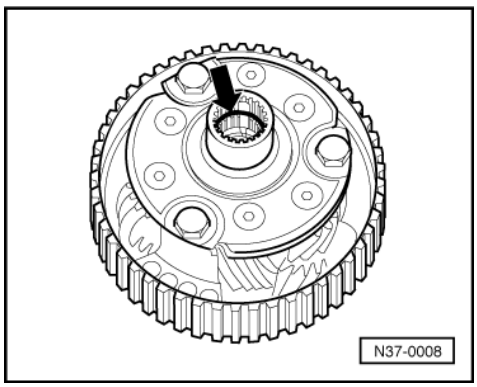
12 O-ring

- Renew

13 Gasket

- Renew

14 Gearbox housing with clutches installed

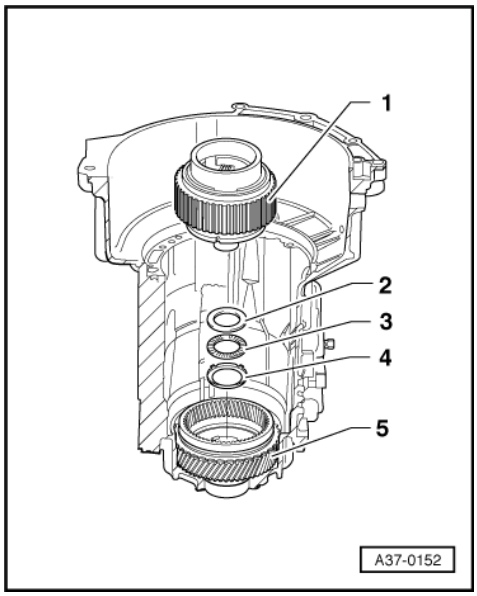


Assembling planetary gearbox

- -> Fit O-ring -arrow- into planet carrier.

Note:

The planet carrier must be adjusted after replacing planet carrier, large sun gear, large input shaft or small input shaft => Page 87 .



- -> Insert axial needle bearing with washers and planet carrier in the input gear.

1 - Install planet carrier with O-ring fitted
2 - Washer for axial needle bearing
3 - Axial needle bearing
4 - Washer for axial needle bearing; smooth side faces toward input gear
5 - Input gear; is fitted in gearbox housing

=>Page 58

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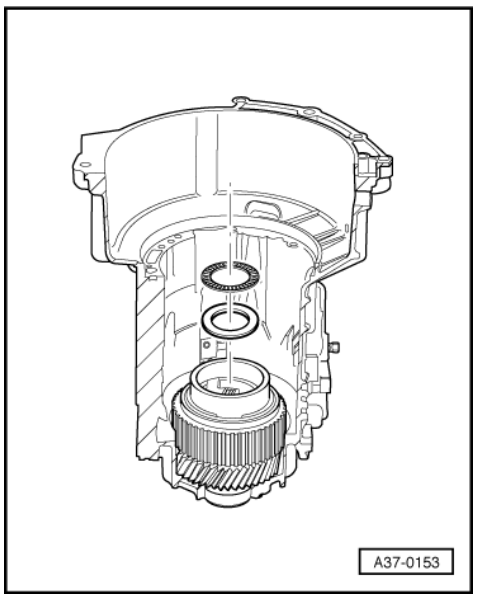
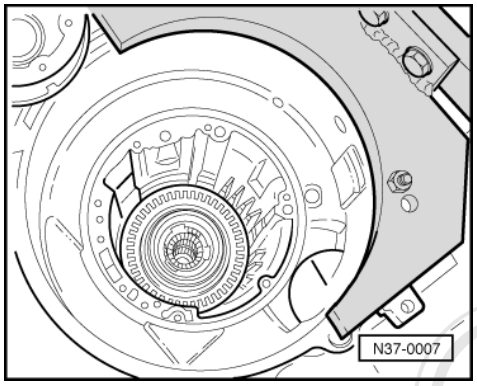


- -> Place washer and axial needle bearing on the small sun gear in the planet carrier.
- Centralize washer and axial needle bearing in small sun gear.

- Insert shim(s).



- Insert inner and outer -B1- plates.
- Insert pressure plate of -B1- with flat side facing plates.

Note:

Thickness of pressure plate varies according to number of plates=>Page 69 .

- -> Insert dished washer with convex facing towards free wheel.

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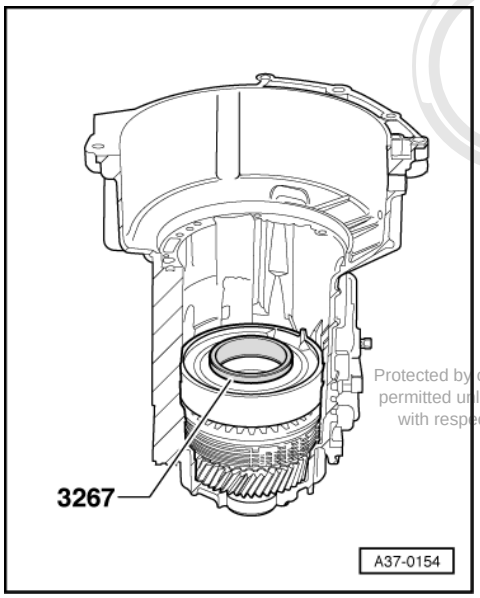
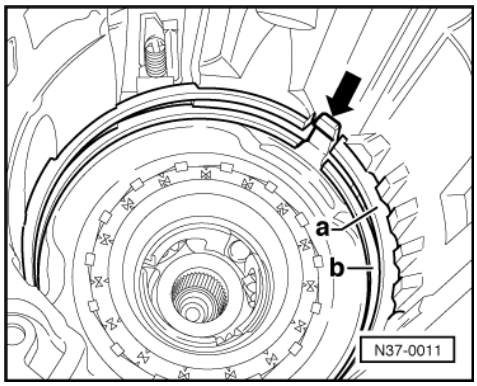


Note:

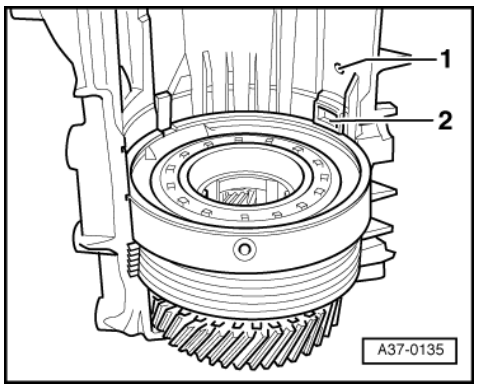
When replacing the following components, adjust the reverse gear brake -B1-=>Page 93 :

- Free wheel
- Piston for reverse gear brake -B1-
- Plates
- Gearbox housing

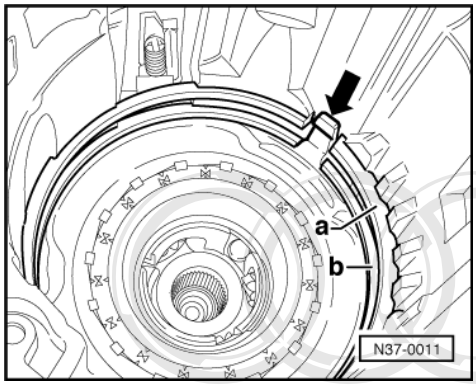
- -> Preload free wheel rollers with assembly ring 3267 and insert free wheel.



- -> Installation position of free wheel: The retaining wedge (arrow) must be seated in the machined groove on gearbox housing.
- Fit circlip -b- for free wheel with open ends of circlip facing toward retaining wedge of free wheel.



- -> Insert baffle block -2- in gearbox housing groove, where ATF breather drilling -1- is located.



- -> Install circlip -a- for supporting tube for -B2- with open ends of circlip facing toward retaining wedge - arrow- of free wheel.
- Perform check measurement of -B1-
=>Page 97

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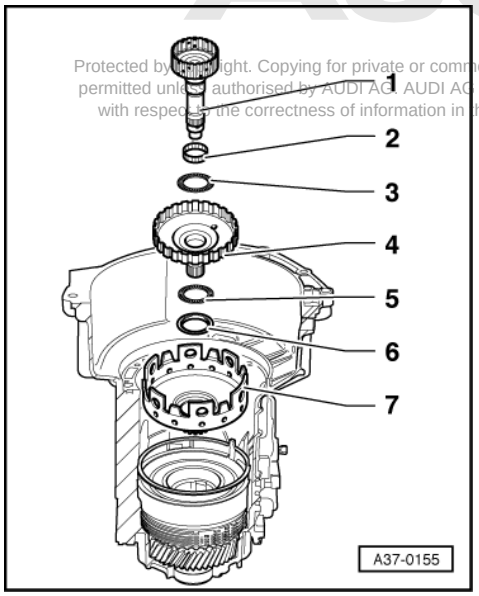
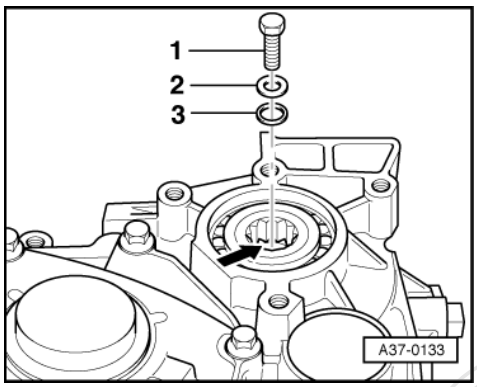


- -> Install the parts in the gearbox housing in the reverse order of the numbering:

1 - Small drive shaft
2 - Needle bearing
3 - Axial needle bearing
4 - Large drive shaft
5 - Axial needle bearing
6 - Washer for axial needle bearing
(shoulder faces toward large sun gear)
7 - Large sun gear



- -> Install bolt -1- for small drive shaft with washer -2- and shim -3-.
- Tighten bolt to 30 Nm.

Notes:

- Insert shim -3- onto small input shaft shoulder (arrow).
- Determining shim thickness => adjusting planet carrier, Page 87 .

- Perform planet carrier check measurement
  => Page 92 .

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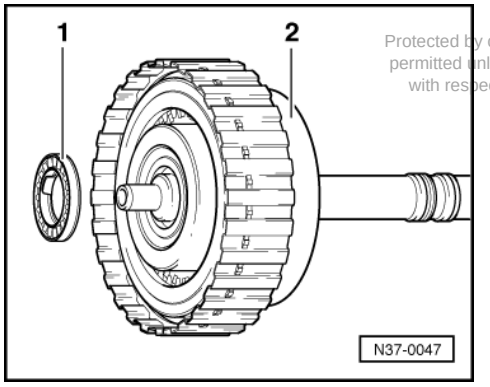
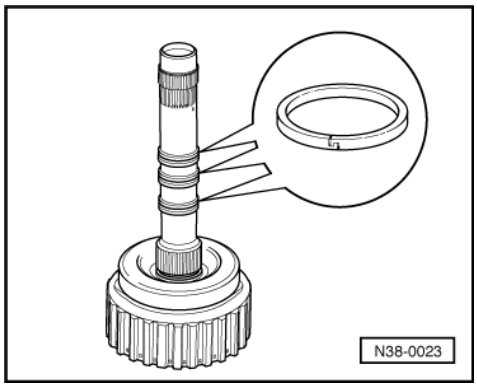
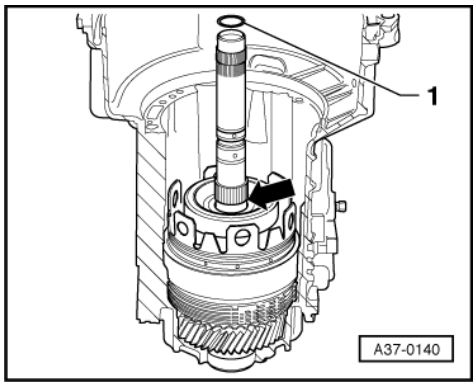


- LIghtly lubricate washer of axial needle bearing with ATF so that bearing sticks onto 3rd and 4th gear clutch -K3- when it is installed.
- -> Fit axial needle bearing together with washer -1- onto 3rd and 4th gear clutch -K3- , -Item 2-.
  - Installation position: bearing washer faces toward -K3-.



- -> Ensure piston rings seat correctly on -K3-.
- Ensure that the ends of the piston rings are hooked together.

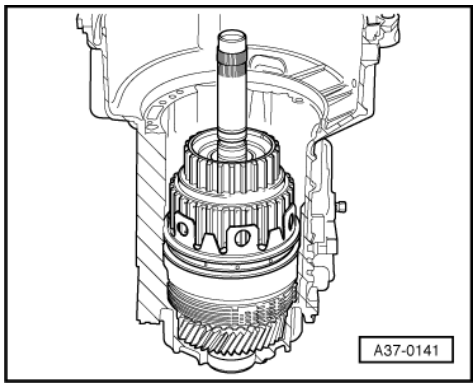


- -> Insert 3rd and 4th gear clutch -K3-.

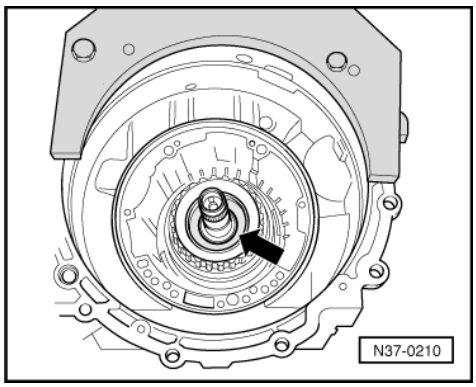
Note:

When installing, rotate 3rd and 4th gear clutch -K3- until all the plates have meshed.

- Fit seal -1- in the groove (arrow).



- -> Insert 1st to 3rd gear clutch -K1-.



- -> Insert shim(s) -arrow- in -K1-.

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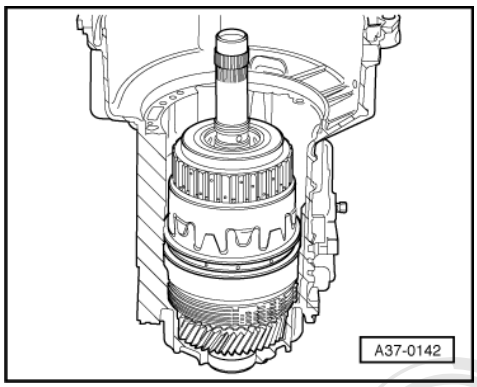
Notes:

- The shim thickness must be recalculated when replacing -K1-, -K2-, the small input shaft or the ATF pump, => Adjusting clutch play between -K1- and -K2-, Page 98 .
- 1, 2 or 3 shims can be installed.

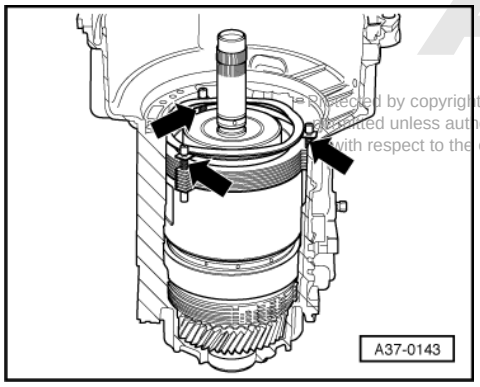


- -> Insert reverse gear clutch -K2-.

Note:

When installing, rotate reverse gear clutch -K2- until all the plates have meshed.

- Insert supporting tube for plate set of 2nd and 4th gear brake -B2- so that recess on lower part of supporting tube engages in retaining wedge of free wheel.



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- -> Install -B2- 2nd and 4th gear brake plates as follows:
  - First insert a 3 mm thick outer plate.
  - Fit three spring caps into the outer plate.
  - Insert the compression springs (arrows).
  - Insert all the plates with the exception of the last outer plate.
  - Calculate thickness of last outer plate
    =>IV - Adjusting 2nd and 4th gear brake -B2-, Page 102 .

Note:

When replacing the following components, adjust the 2nd and 4th gear brake -B2-=>Page 102 :

- Gearbox housing
- Supporting tube
- ATF pump
- Plates
  - Before fitting the last, correctly sized outer plate, fit 3 spring caps onto compression springs.
  - Insert last outer plate.

Note:

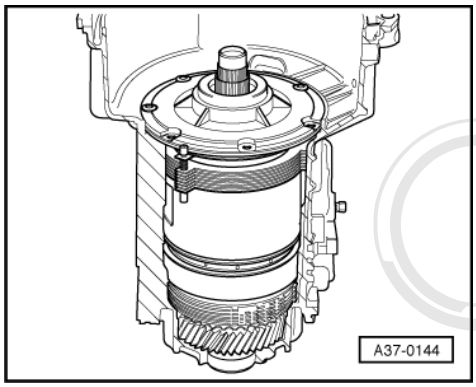
If it is necessary to fit two outer plates because of the results of the measurement, these should be fitted together on the spring caps.

- Install corrugated washer
- Install ATF pump gasket, noting position of holes.

- Fit O-ring on ATF pump.

Note:

Ensure the piston rings are properly seated.



- -> Install ATF pump so that holes for securing bolts are correctly positioned.
- Tighten bolts evenly, crosswise, to 8 Nm.

Note:

Ensure that the O-ring is not damaged.

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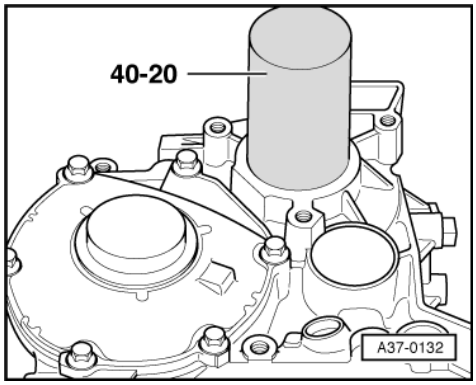
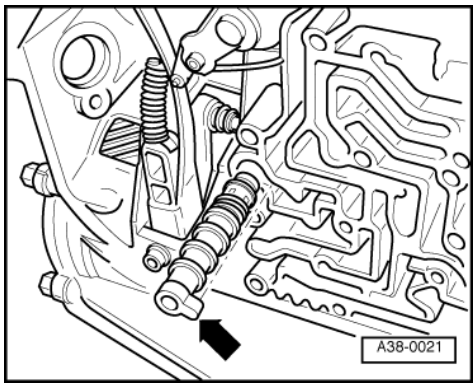
- Then turn bolts 90 ° further.

  Turning further can be done in several stages.

- Carry out check measurement of clutch play => Page 102 .



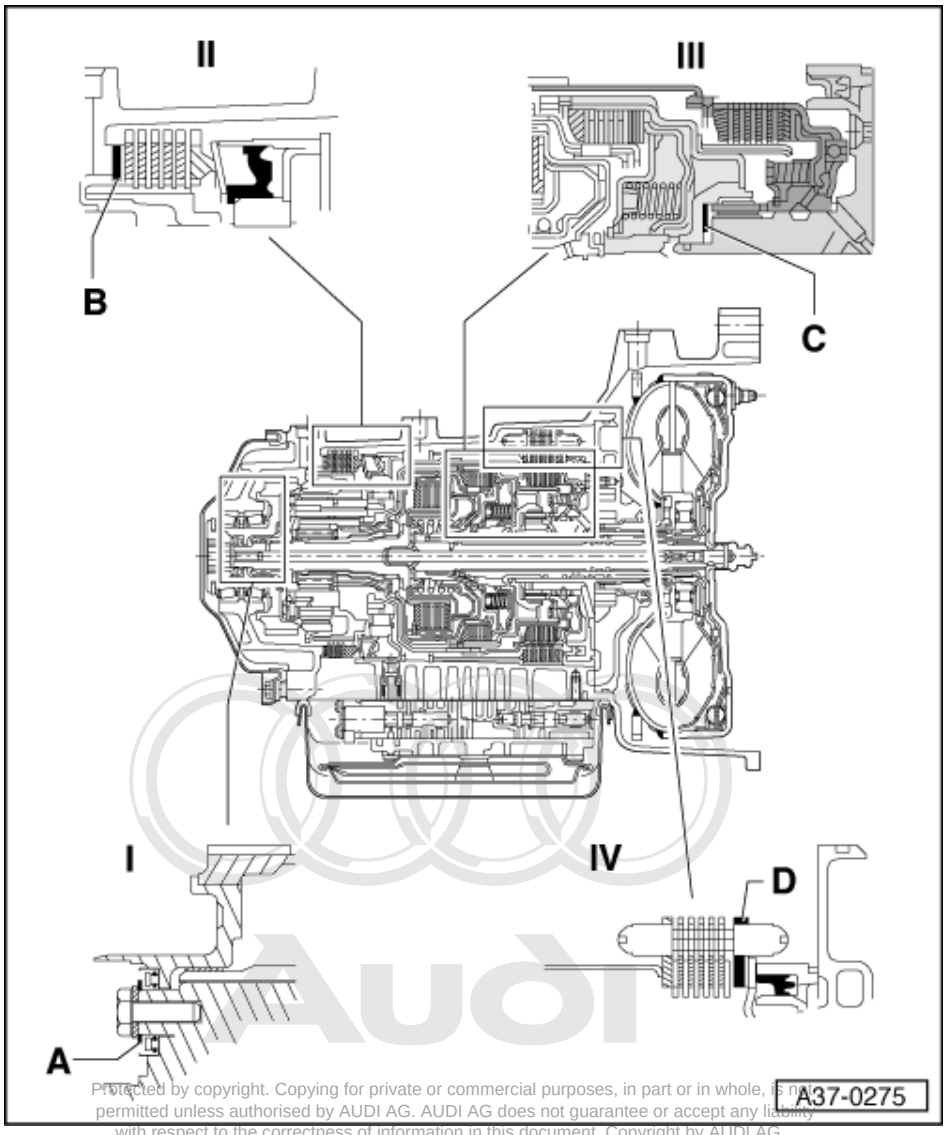
- -> Drive in cover with drive sleeve 40-20.
- Install gearbox speed sender -G38=>Page 146 .



- -> Insert sealing plug with O-rings.
  - Installation position: lug -arrow- fits into oil passage.
- Install valve body with conductor strip => from Page 132 .

- Install sump => from Page 132 .
- Install torque converter => from Page 10 .
- Install gearbox=>Page 33 .
- Fill up with ATF and check ATF level => Page 38 .

6.16 - Planetary gearbox adjustments - overview



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I - Planet carrier

- A - Shim
- Determining thickness => Adjusting planet carrier, Page 87

II - Reverse gear brake -B1-

- B - Shim
- Determining thickness
  => Adjusting reverse gear brake -B1-, Page 93

III - Clutch play

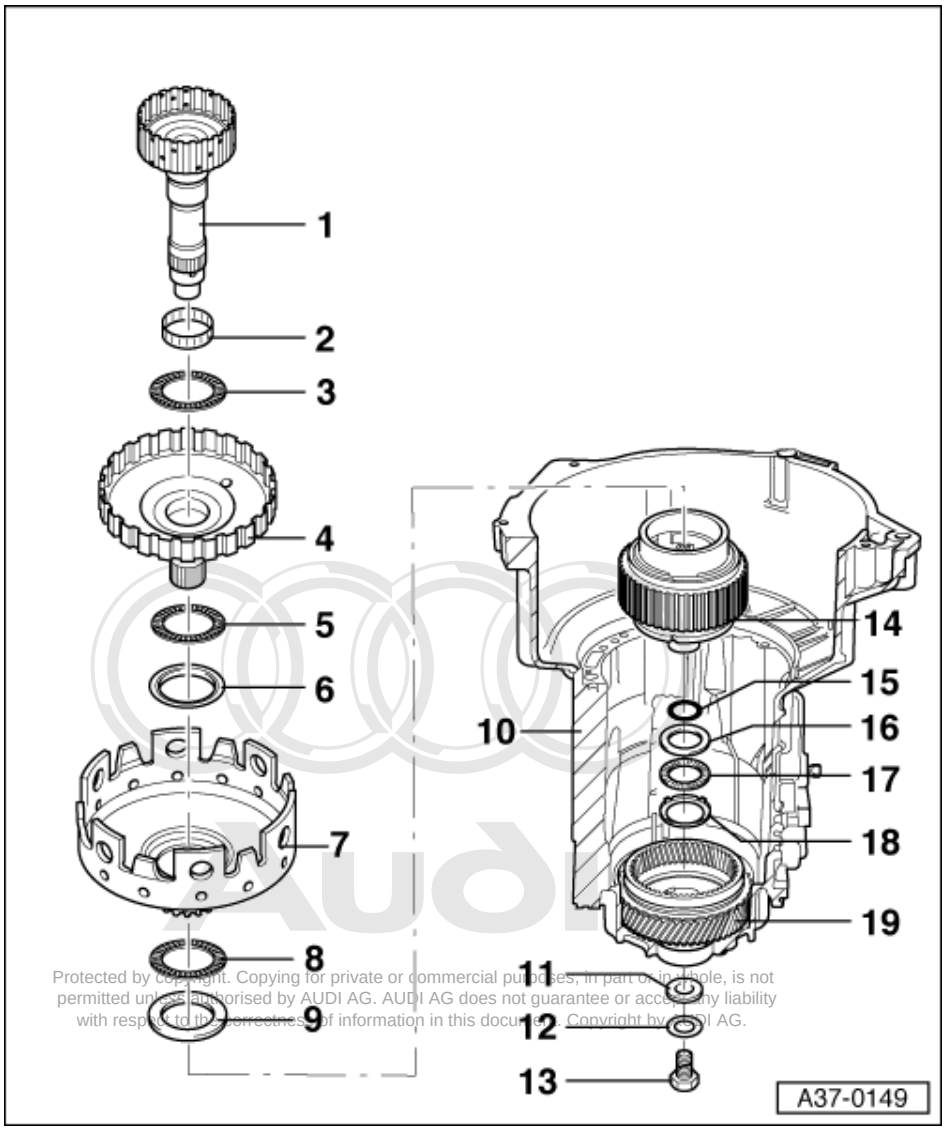
- C - Shim
- Determining thickness => Adjusting clutch play between -K1- and -K2-, Page 98

IV - 2nd and 4th gear brake -B2-

- D - Outer plate
- Determining thickness

=> Adjusting 2nd and 4th gear brake -B2-, Page 102

6.17 - I - Adjusting planet carrier



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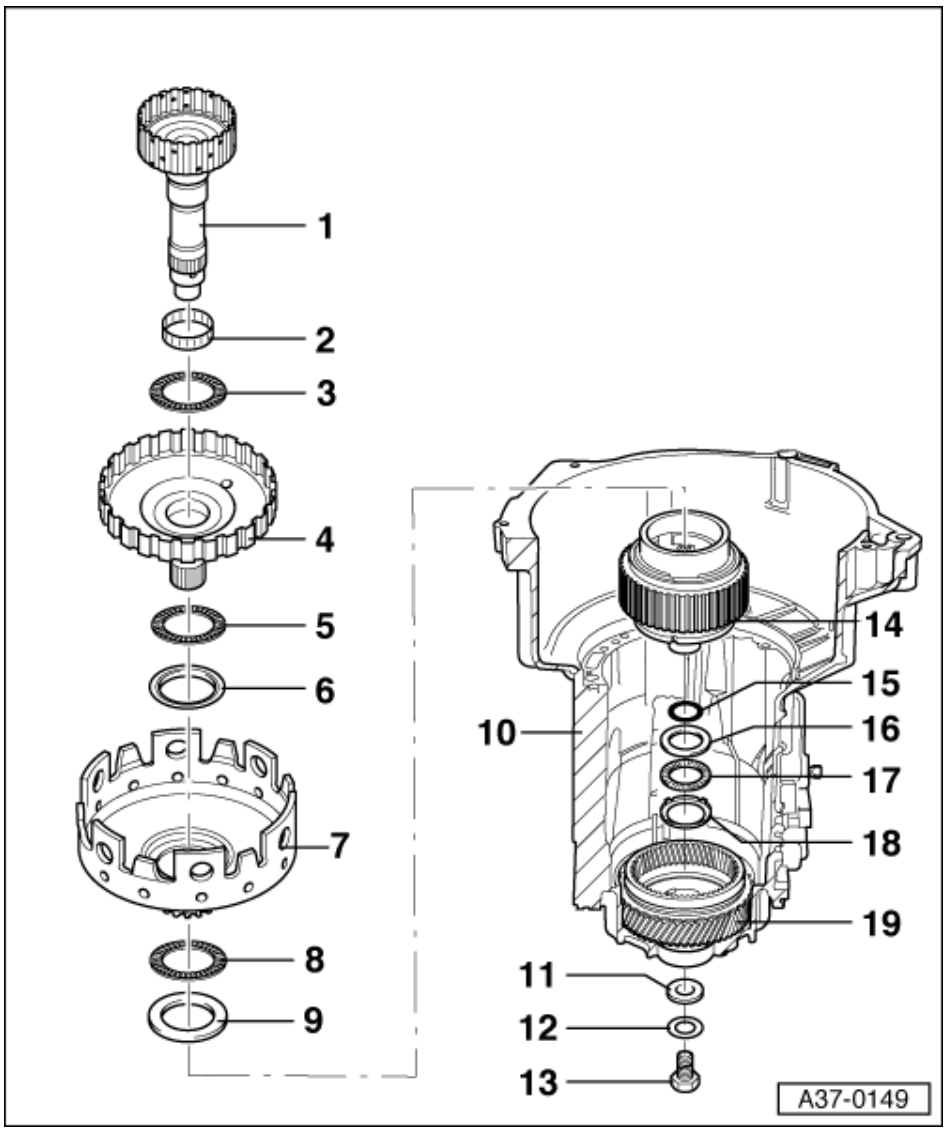
Overview of components

Note:

When adjusting planet carrier, install components in gearbox housing without shim (Item 11).

1 Small input shaft
2 Needle bearing
3 Axial needle bearing
4 Large drive shaft
5 Axial needle bearing
6 Washer
- Insert into large sun gear

=> Assembling planetary gearbox, Page 78



7 Large sun gear
8 Axial needle bearing
9 Washer
10 Gearbox housing
- With input gear and axial needle bearing
- Axial needle bearing remains in input gear
- If axial needle bearing is damaged => Removing and installing input gear, Page 161

11 Shim
- Do not install in planet carrier when adjusting

12 Washer
13 Bolt for small drive shaft - 30 Nm

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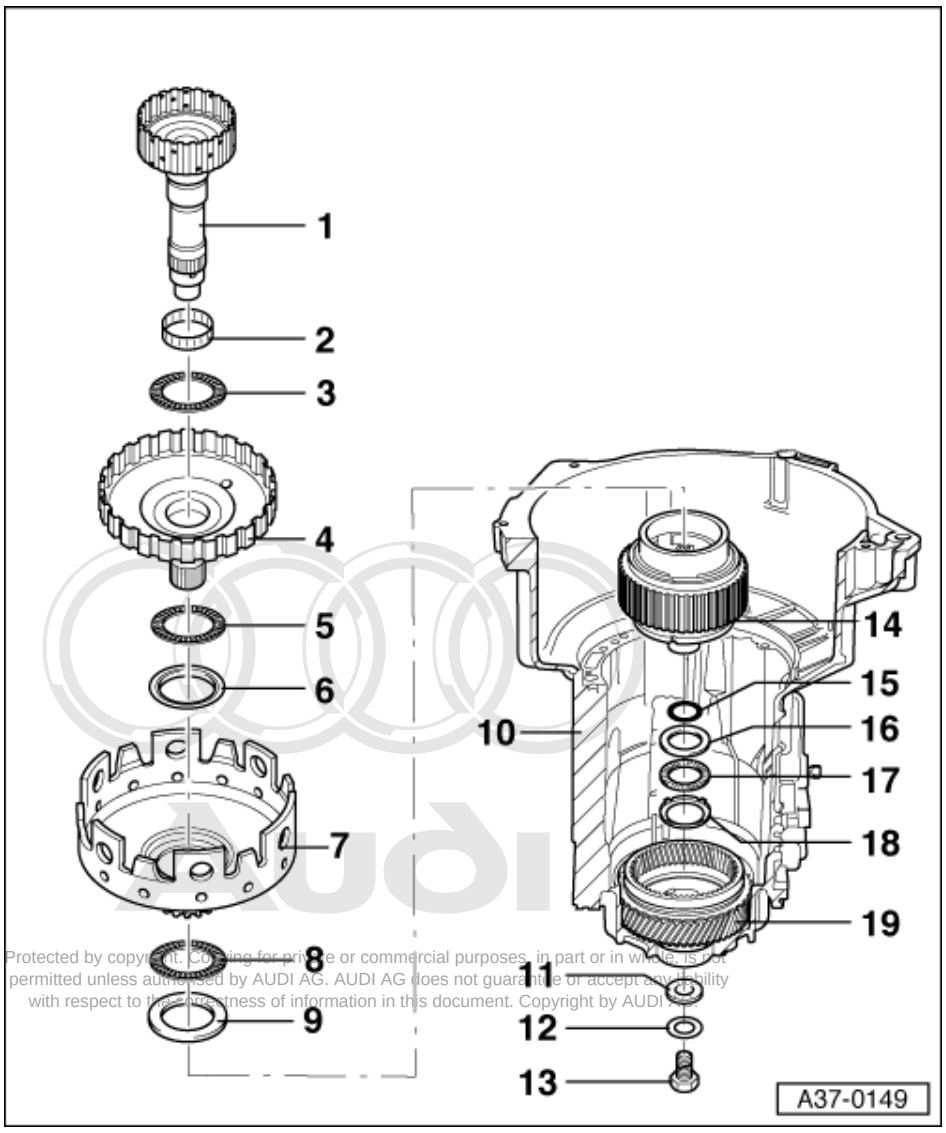

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14 Planet carrier

15 O-ring

- Renew
- Insert into planet carrier => Assembling planet carrier, Page 78

16 Axial needle bearing washer

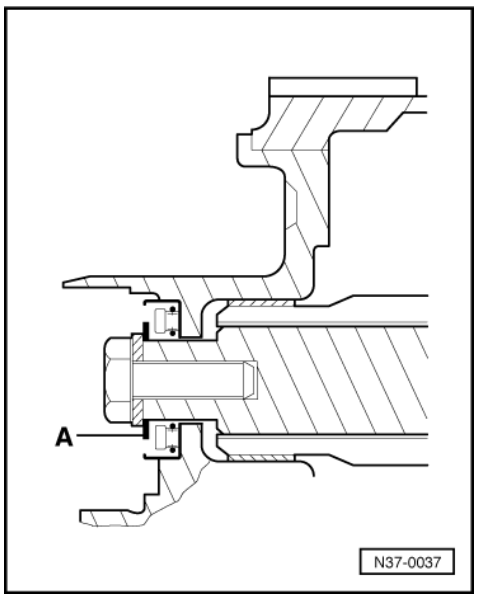
17 Axial needle bearing

18 Axial needle bearing washer

- Installation position: smooth side faces toward input gear

19 Input gear

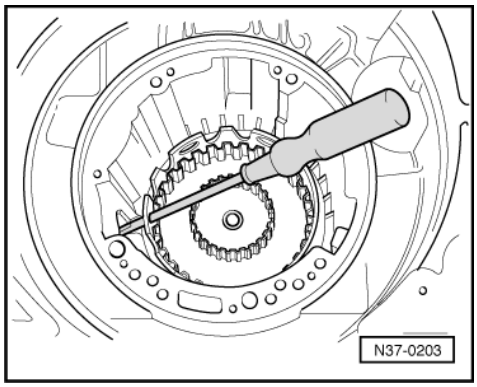
- Do not remove to adjust the planet carrier



-> Determining shim -A-

- To adjust planet carrier, install all components (Items 1 to 9 and 14 to 18) => Page 87 in gearbox housing.

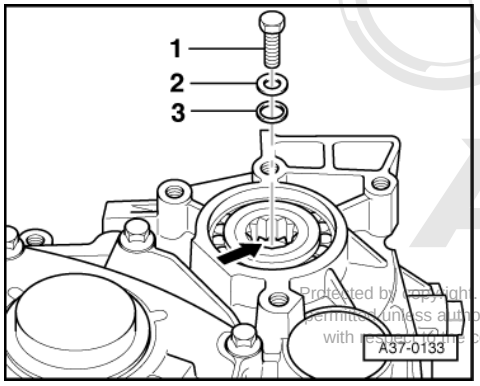
- Engage parking lock.



- -> To slacken bolt for small input shaft, insert screwdriver in holes of large sun gear.

Note:

If the parking lock cannot be engaged, use a second screwdriver to hold the large input shaft.



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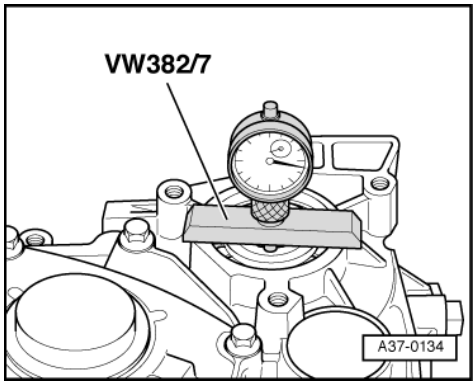
- -> Install bolt -1- for small drive shaft together with washer -2- but without shim -3-.

- Tighten bolt to 30 Nm.



- -> Set up dial gauge so that tip of gauge is positioned on centre of bolt head with 1 mm preload.
- Zero dial gauge.
- Move small input shaft up and take reading.

• Reading in following example: 2.00 mm.

- Select thickness of shim according to table=>Page 91 . Determine Part No.

=> Parts catalogue

Table of shims -A-

Gauge reading (mm)	Shim (mm)	Gauge reading (mm)	Shim (mm)
1.26 ... 1.35	1.0	2.26 ... 2.35	2.0
1.36 ... 1.45	1.1	2.36 ... 2.45	2.1
1.46 ... 1.55	1.2	2.46 ... 2.55	2.2
1.56 ... 1.65	1.3	2.56 ... 2.65	2.3
1.66 ... 1.75	1.4	2.66 ... 2.75	2.4
1.76 ... 1.85	1.5	2.76 ... 2.85	2.5
1.86 ... 1.95	1.6	2.86 ... 2.95	2.6
1.96 ... 2.05	1.7	2.96 ... 3.05	2.7
2.06 ... 2.15	1.8	3.06 ... 3.15	2.8
2.16 ... 2.25	1.9	3.16 ... 3.25	2.9

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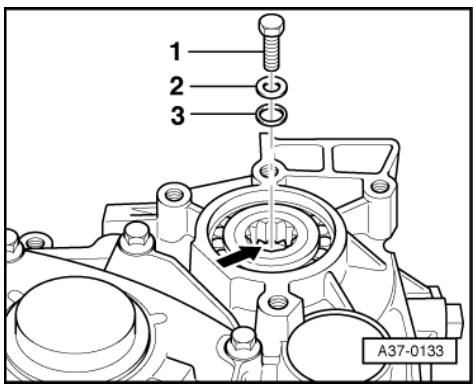
- Remove small input shaft bolt.



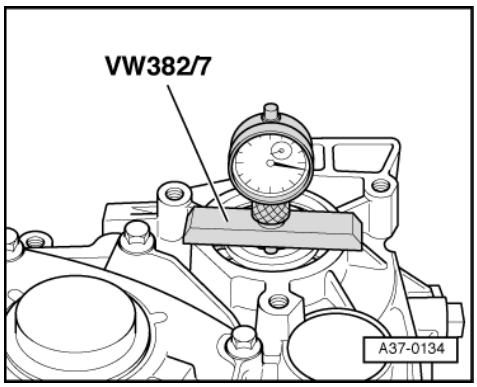
- -> Fit determined shim -3- onto small input shaft (arrow).

Example:

If the reading is 2.00 mm use a shim with a thickness of 1.7 mm.

- Insert bolt -1- for small input shaft together with washer -2-.
- Tighten bolt to 30 Nm.
- Carry out planet carrier check measurement => Page 92 .

Planet carrier check measurement



- -> Insert dial gauge in VW 382/7 and place the tip on the bolt of the small input shaft.
- Move small input shaft up and down and take reading of play on dial gauge.

• Play: min. = 0.23 mm; max. = 0.37 mm.

Note:

If the planet carrier has been adjusted with reverse gear brake -B1- and free wheel removed then before installing planet carrier install reverse gear brake -B1-, => Assembling planetary gearbox, Page 78 .

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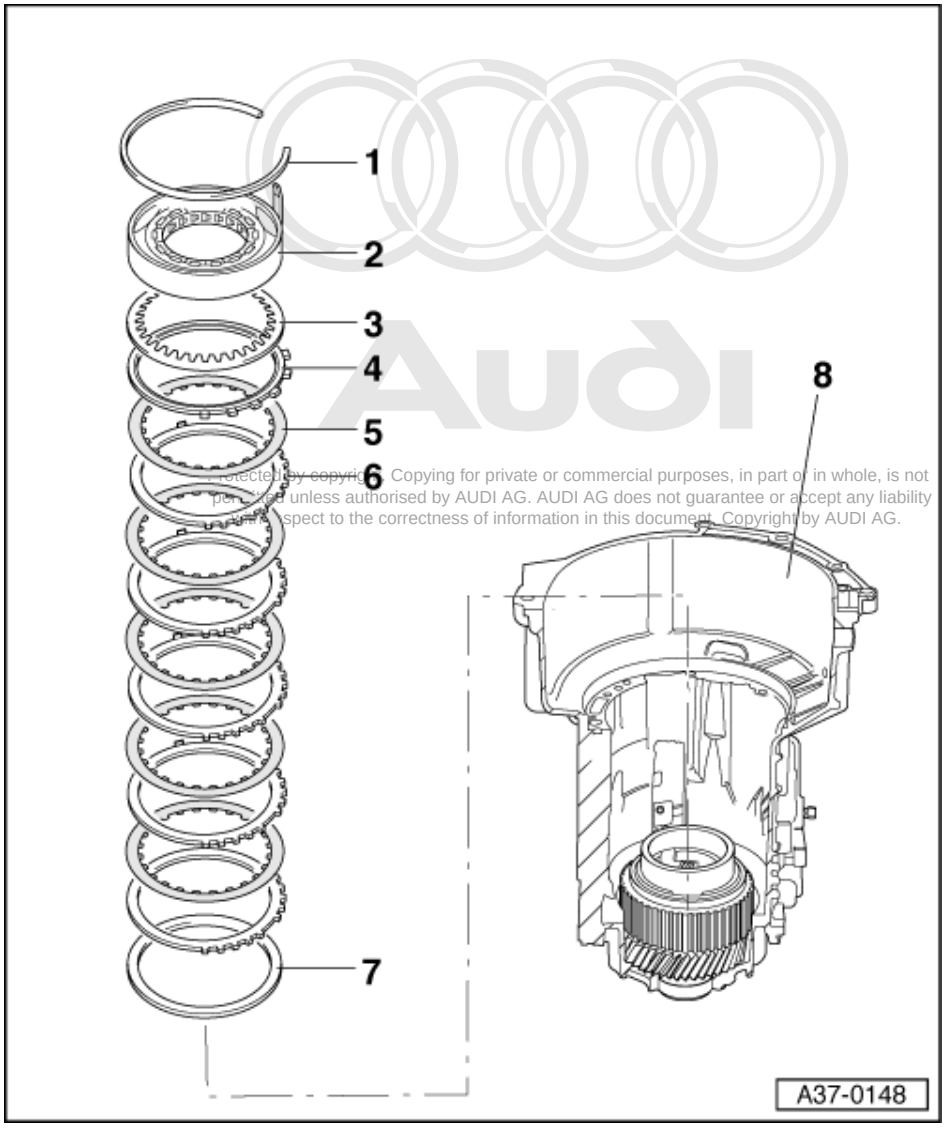
6.18 - II - Adjusting reverse gear brake -B1- - overview



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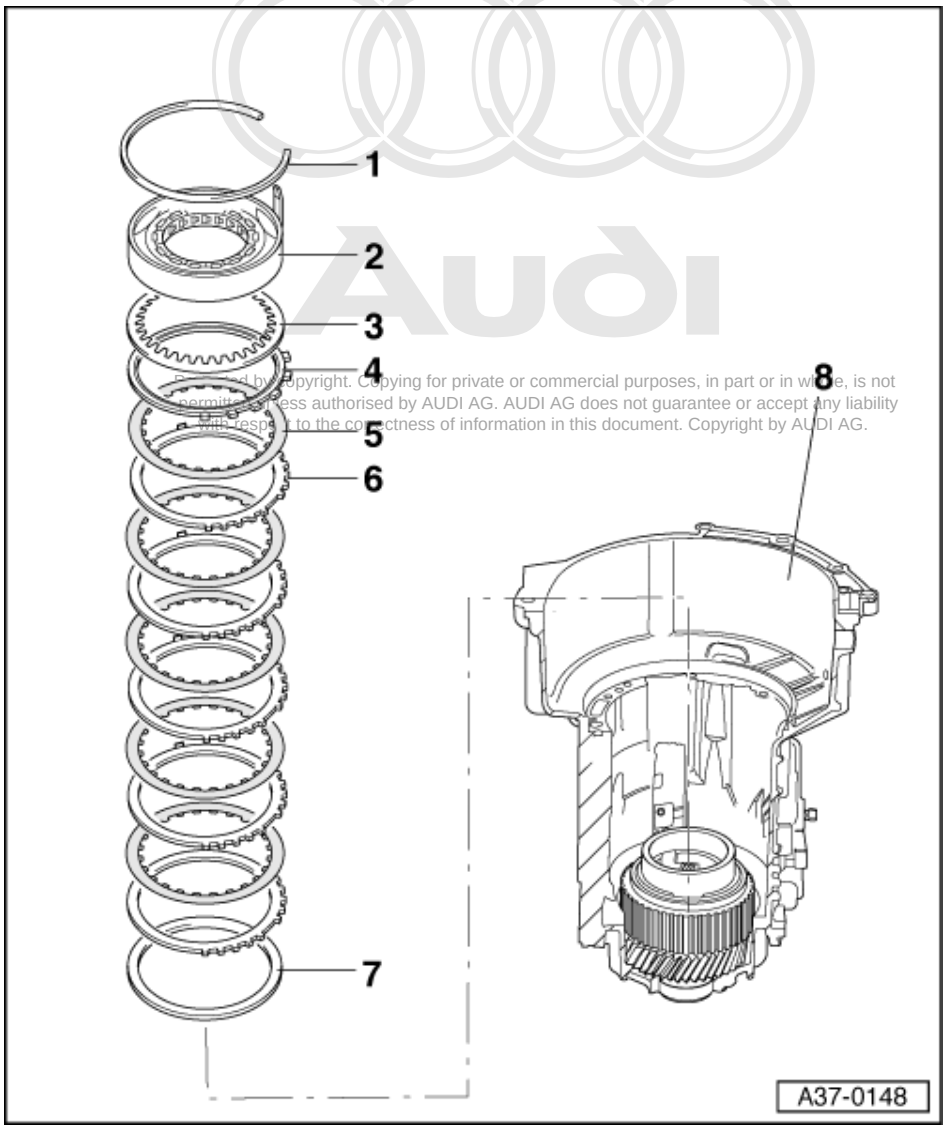
Overview of components

1 Circlip
2 Free wheel with -B1- piston
3 Dished washer
- Installation position: Convex side faces toward free wheel

4 Pressure plate
- Installation position: Flat side faces toward plates
- Replacement part must be selected according to gearbox code letters (different identifications)



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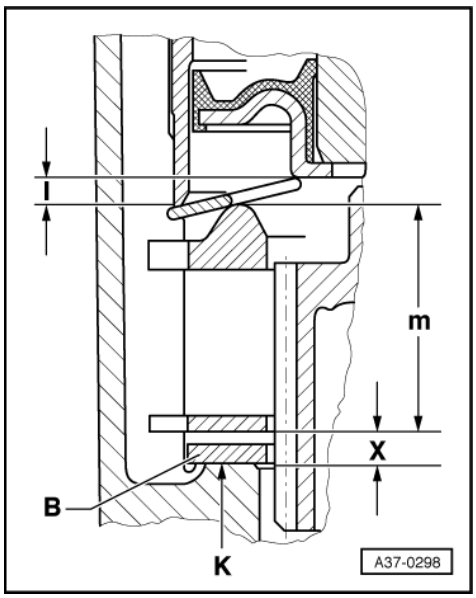
5 Inner plate -B1-
- Quantity => from Page 2

6 Outer plate -B1-
- Quantity => from Page 2

7 Shim
- 1 or 2 shims can be installed

8 Gearbox housing
- With input gear and planet carrier installed



-> Determining thickness of shim -B-

The thickness of the shim depends on the size of gap "x". Gap "x" is calculated using the following formula:

x = K + (I /2) - m

B	= Shim
x	= Gap
I	= Position of piston in free wheel; calculating "I"=> Page 95
m	= Height of plate set including pressure plate; calculating "m" => Page 96
K	= Constant value: 30.5 mm; "K" is determined by installation height in gearbox housing and is not adjustable.

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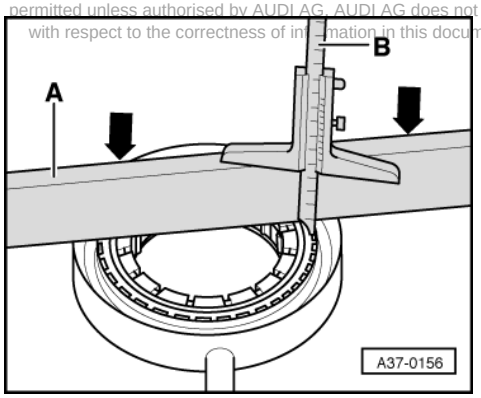


Calculating "I"

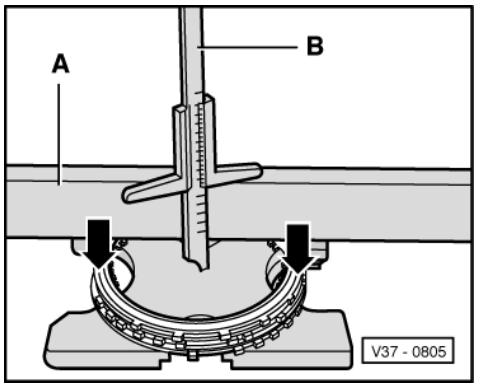
- Press piston into free wheel as far as stop.
- -> Place straightedge -A- onto outer race of free wheel and hold in position -arrows-.
- Use depth gauge -B- to measure down to inner edge of piston.

Example:

Reading	51.8 mm
- Straightedge	48.2 mm

= Calculated size "l"	3.6 mm

Calculating "m"



- -> Place straightedge "A" on thrust plate.
- Compress set of plates including pressure plate in direction of arrow and measure the thickness of plate set with depth gauge "B".

Example:

Reading	77.2 mm
- Straightedge	48.2 mm
= Calculated size "m"	29.0 mm

Example for calculating gap:

x = K + (l /2) - m

x = 30.5 + (3.6/2) - 29.0 = 3.3 mm

- Determine size of shim(s) according to table=>Page 96 .
  Determine Part No.

=> Parts catalogue

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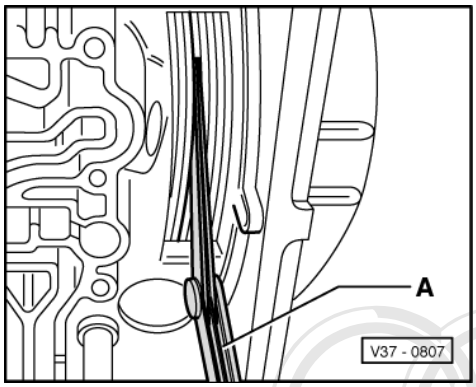
- After determining shim for -B1- carry out check measurement.

Table of shims -B-

Gap "x" (mm)	Shim(s) (mm)	Gap "x" (mm)	Shim(s) (mm)
2.36 ... 2.45	1.0	3.36 ... 3.45	1.0 + 1.0
2.46 ... 2.55	1.1	3.46 ... 3.55	1.0 + 1.1
2.56 ... 2.65	1.2	3.56 ... 3.65	1.1 + 1.1
2.66 ... 2.75	1.3	3.66 ... 3.75	1.1 + 1.2
2.76 ... 2.85	1.4	3.76 ... 3.85	1.2 + 1.2
2.86 ... 2.95	1.5	3.86 ... 3.95	1.2 + 1.3
2.96 ... 3.05	1.6	3.96 ... 4.05	1.3 + 1.3
3.06 ... 3.15	1.7	4.06 ... 4.15	1.3 + 1.4
3.16 ... 3.25	1.8	4.16 ... 4.25	1.4 + 1.4
3.26 ... 3.35	1.9		

Reverse gear brake -B1- check measurement

- Install parts up to free wheel and secure with circlip
  => Assembling planetary gearbox, Page 78 .



- -> Use a feeler gauge -A- to measure play between the plates (accessible through gap next to valve body flange).

• Play: min. = 1.20 mm; max. = 1.80 mm.

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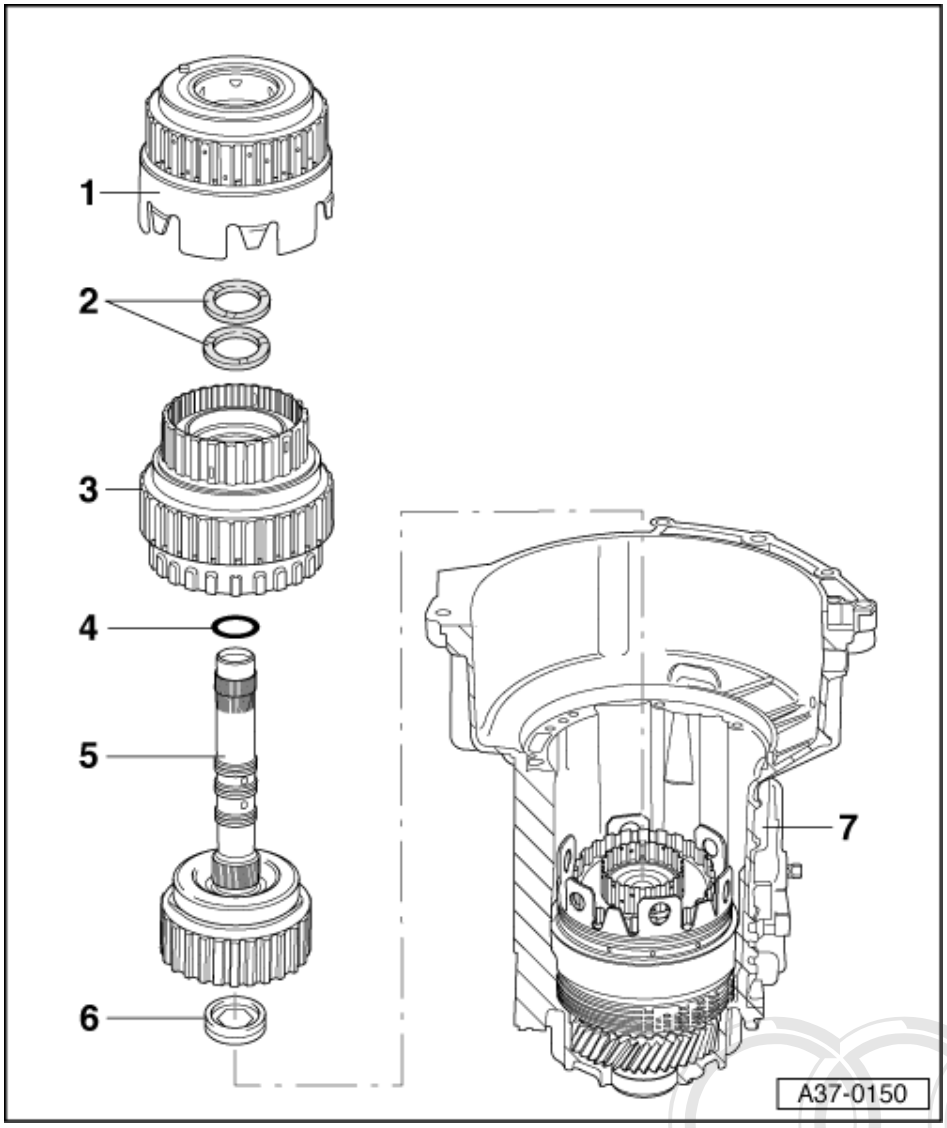
6.19 - III - Adjusting clutch play between -K1- and -K2-



Overview of components

Note:

To adjust the clutch play, install components without shim(s) (Item 78

1 Reverse gear clutch -K2-

- Does not need to be installed to determine shim(s)
- Install for check measurement

2 Shim

- Do not install when adjusting clutch play
- 1, 2 or 3 shims may be installed

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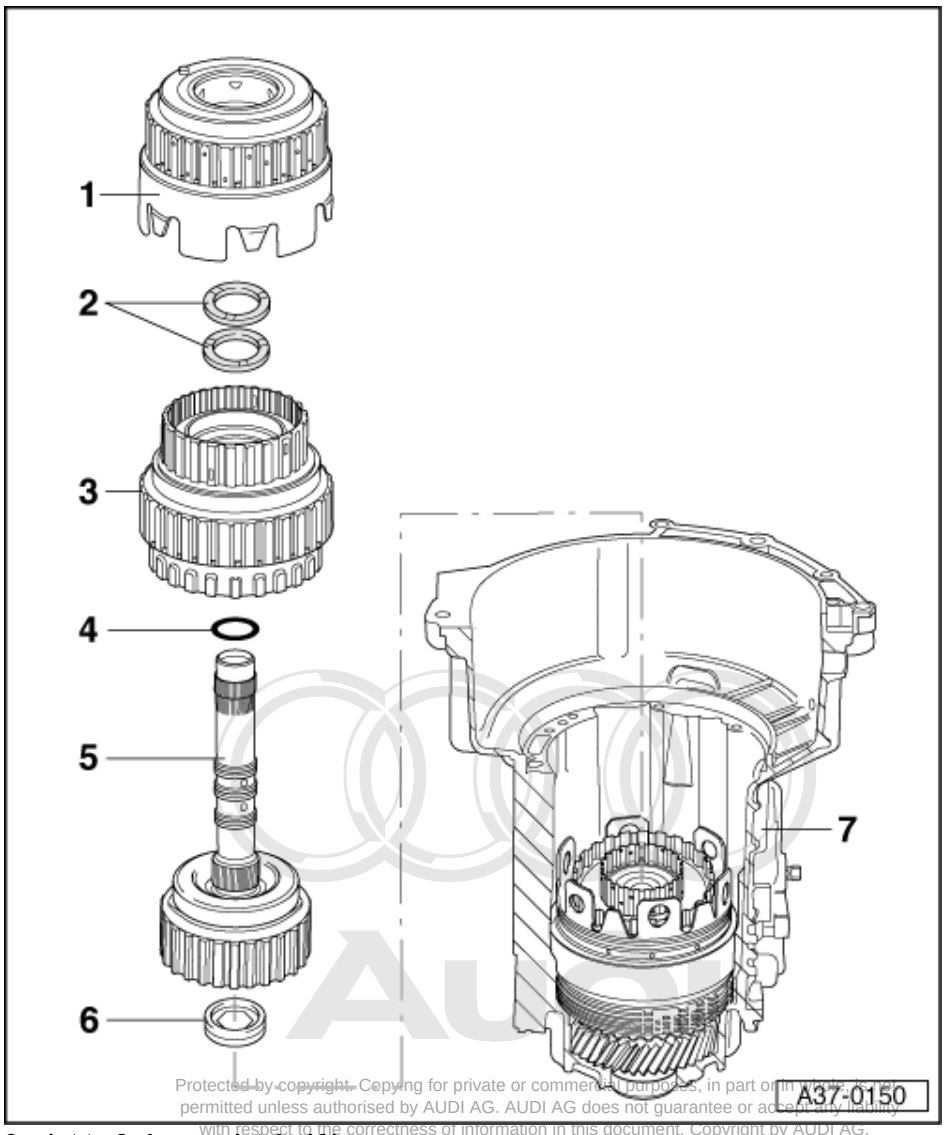

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3 1st to 3rd gear clutch -K1-

4 O-ring

5 3rd and 4th gear clutch -K3- with turbine shaft

6 Axial needle bearing with washer

- Axial needle bearing faces towards small input shaft
- Washer faces towards -K3-

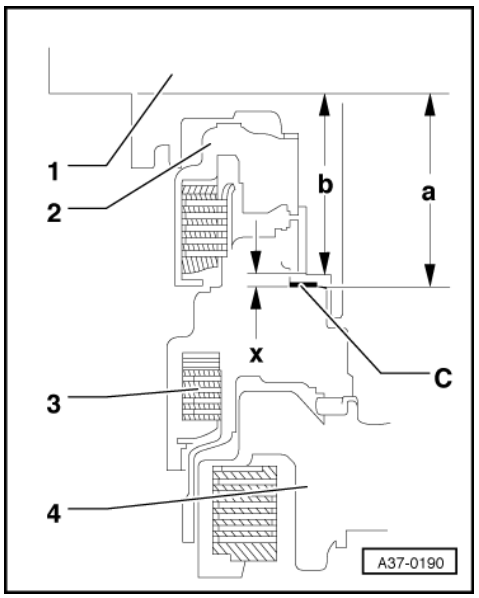
7 Gearbox housing

- Planetary gearbox installed up to small input shaft => Assembling planetary gearbox, Page 78

Determining thickness of shim(s) -C-

Conditions:

- Planet carrier has been installed and adjusted => Assembling planetary gearbox, Page 78
- To perform measurement, gearbox housing must be turned on repair stand so that input gear is facing downwards, as shown on => Page 98 .



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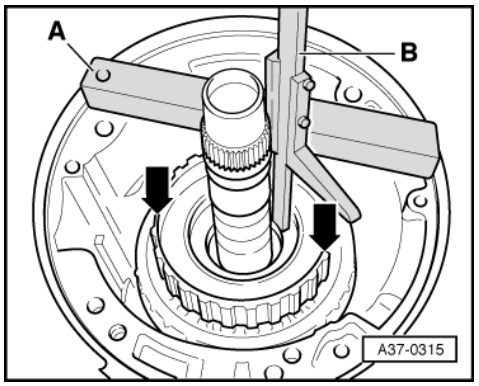
-> The thickness of the shim(s) depends on the size of gap "x". Gap "x" is calculated using the following formula:

x = a - b

1 - ATF pump
2 - Reverse gear clutch -K2-
3 - 1st to 3rd gear clutch -K1-
4 - 3rd and 4th gear clutch -K3-

A	=	Shim(s)
x	=	Gap
a	=	Installed depth of clutch -K1-; calculating => Page 100
b	=	Size of ATF pump housing; calculating => Page 101



Calculating "a"

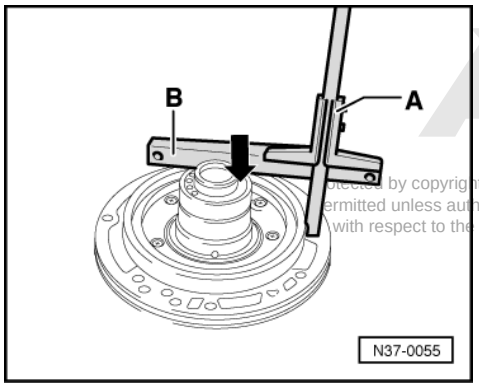
- -> Place short straightedge "A" onto pump flange on gearbox housing.
- Press -K1- down in direction of arrow and measure distance into -K1- with depth gauge "B".

Example:	
Reading	73.7 mm

Example for calculating "a":

Reading	73.7 mm
- Straightedge	19.5 mm
= Calculated distance "a"	54.2 mm

Calculating "b"



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- Place paper gasket onto ATF Pump.
- -> Place straightedge -B- onto stator support (arrow) and measure with depth gauge -A- to gasket of pump flange.

Example:

Reading	70.5 mm
- Straightedge	19.5 mm
= Calculated distance "b"	51.0 mm

Example for calculating "x":

Gap x = a - b

= 54.2 mm - 51.0 mm = 3.2 mm

- Determine shim(s) according to table =>Page 101 . Determine Part No.

=> Parts catalogue

- Carry out clutch play check measurement after installing ATF pump.

Table of shims -C-

Gap "x" (mm)	Shim(s) (mm)
... 2.54	1.4
2.55 ... 3.09	1.0 + 1.0
3.10 ... 3.49	1.2 + 1.2
3.50 ... 3.89	1.4 + 1.4
3.90 ... 4.29	1.6 + 1.6
4.30 ... 4.69	1.8 + 1.8
4.70 ... 5.04	1.2 + 1.2 + 1.6
5.05 ... 5.25	1.2 + 1.2 + 1.8

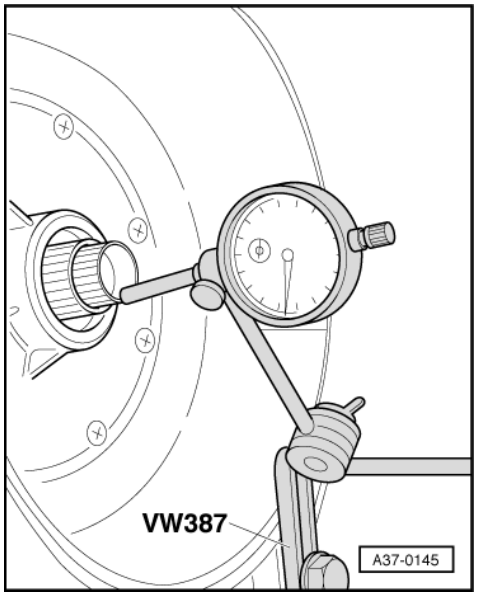
Check measurement (clutch play)

- The clutch play cannot be measured until the ATF pump has been installed.
- Reverse gear clutch -K1- must be installed.

- Attach dial gauge holder to gearbox housing and place dial gauge on turbine shaft with a preload of 1 mm.

Note:

Bring the gearbox into its normal position as installed in the vehicle to enable the turbine shaft to be moved.



- -> Pull turbine shaft out and push it in (shaft will be difficult to move) and read off play on dial gauge.

  Play:
  min. = 0.5 mm
  max. = 1.2 mm

6.20 - IV - Adjusting 2nd and 4th gear brake -B2-

Special tools, testers and auxiliary items

- 3459

Note:

To adjust 2nd and 4th gear brake -B2-, install components without corrugated washer -Item 78 .

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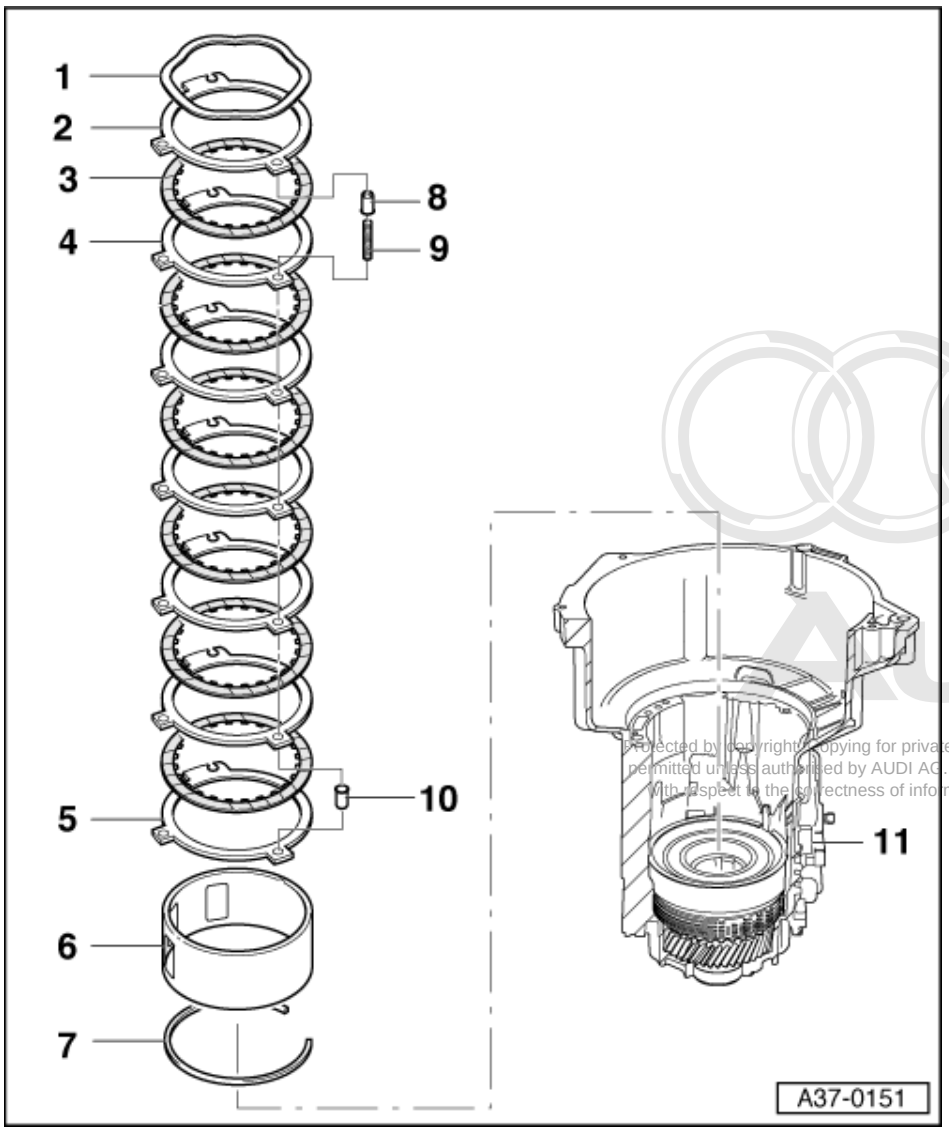

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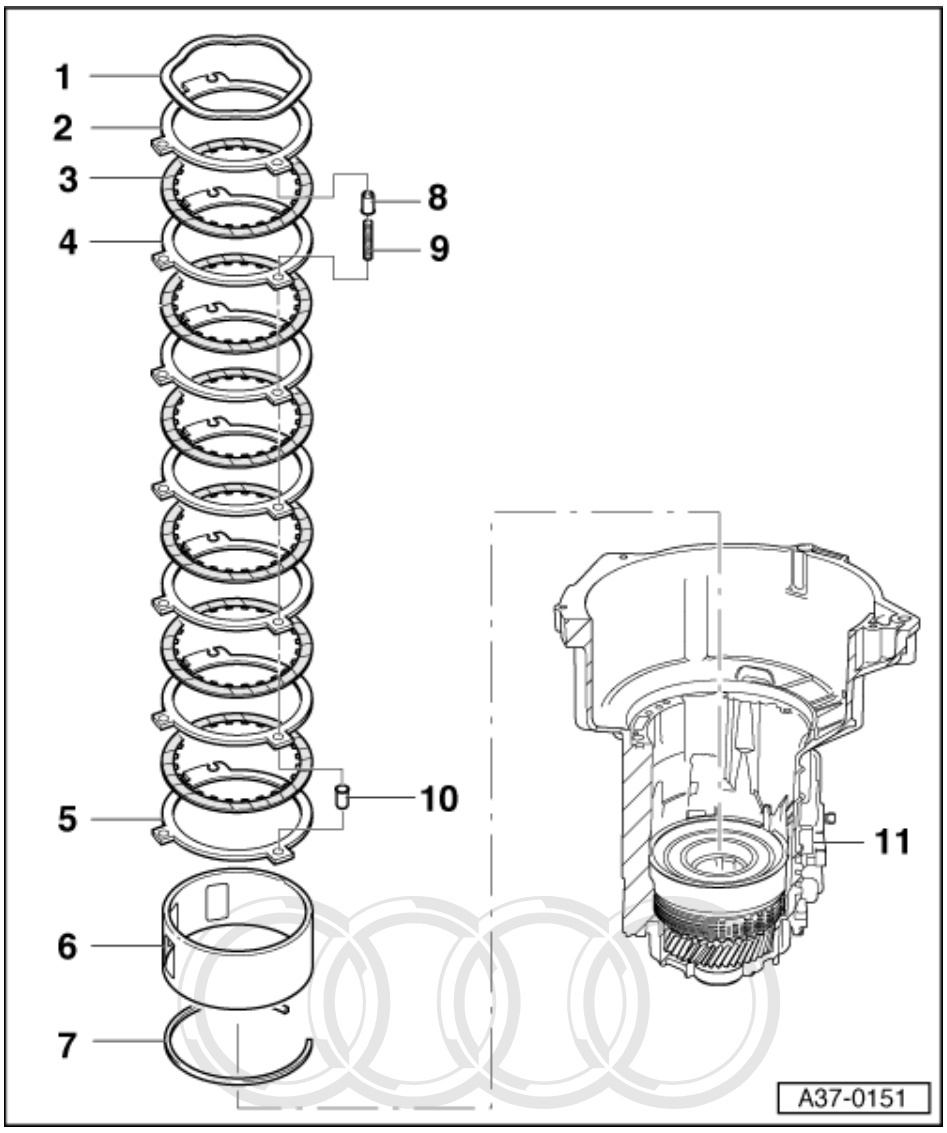
1 Corrugated washer
- Do not install when adjusting -B2-

2 Outer plate -B2-
- Do not install when adjusting -B2-
- 1 or 2 outer plates may be installed.

3 Inner plate -B2-
- Quantity => from Page 2

4 Outer plate -B2-
- Always install 2 mm thick outer plates
- Quantity => from Page 2

5 Outer plate -B2-
- 3 mm thick



6 Supporting tube for -B2-

- Install so that groove in supporting tube engages in the retaining wedge of free wheel
- Spare part is allocated according to gearbox code letters

7 Circlip

- For supporting tube for -B2-
- Installation position: Open ends face toward retaining wedge of free wheel

8 Spring cap

- Do not install when adjusting -B2-
- Install before installing last outer plate
- If 2 outer plates -Item 2 - are fitted, insert spring caps into both plates together

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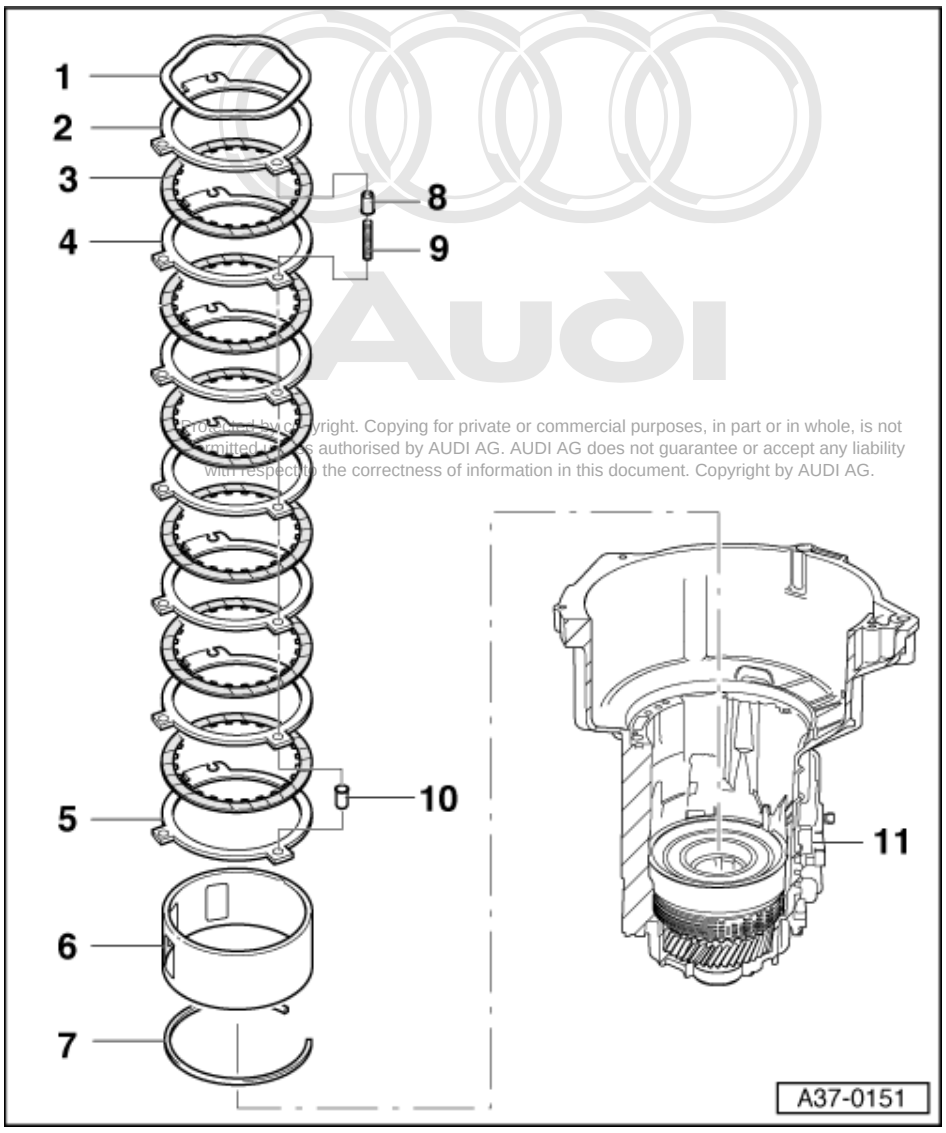

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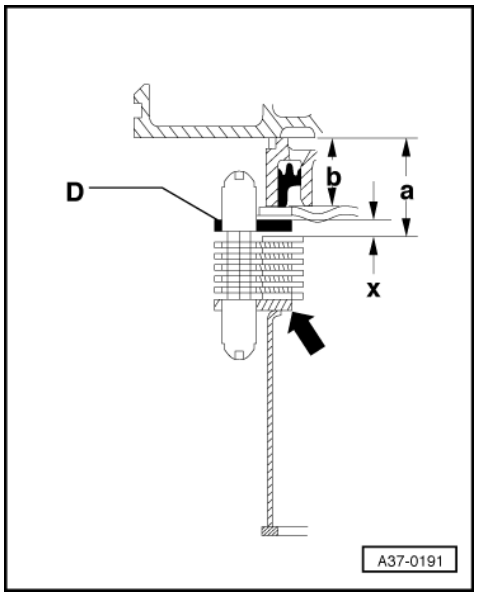
9 Spring

10 Spring cap

- Install after fitting first outer plate

11 Gearbox housing

Calculating thickness of last outer plate -D-



-> The thickness of the outer plate(s) is determined by gap "x". Gap "x" is calculated using the following formula:

x = a - b - 3.6 mm

D	=	Outer plate(s)
x	=	Gap
a	=	Installed depth of 2nd and 4th gear brake -B2-; calculating => Page 106
b	=	Size of ATF pump housing; calculating => Page 107

The illustration shows a cross-section of the brake -B2- in assembled form. Special tool 3459, which exerts a force onto the set of plates, is not illustrated.

3.6 mm is the allowance for settling resulting from the force exerted by special tool 3459.

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Note:

The first outer plate -arrow- is 3 mm thick.

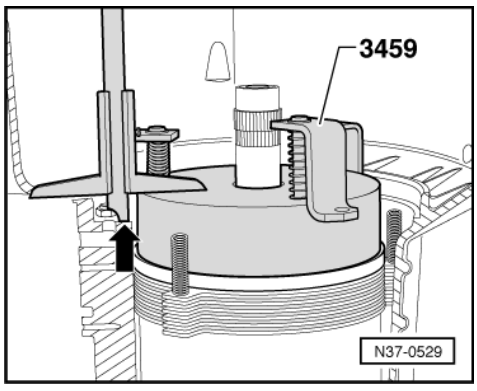
Calculating measurement "a"

Assemble planetary gearbox up to the last -B2- inner plate, =>Page 78 . The last outer plate, the last 3 spring caps and the corrugated washer are not installed.

- Place special tool 3459 onto the last inner plate and turn so that the 3 clips align with the holes for the ATF pump.
- Bolt special tool to flange for ATF pump: tightening torque 5 Nm.

Note:

The plate set for -B2- is now pressed together for measurements.



- -> Measure from pump flange/gearbox housing -arrow- to 3459 with depth gauge.

Dimension a = Height of 3459 in mm - measured value

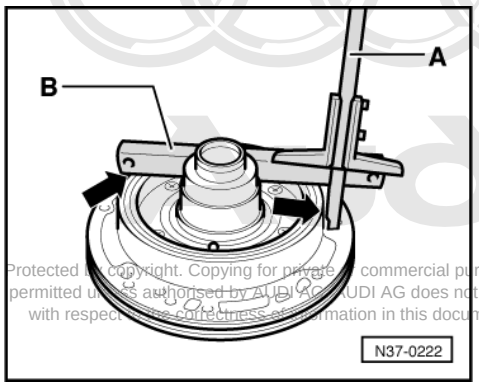
Example:

Height of 3459	60.0 mm
- Measured value	29.8 mm
= Calculated value "a"	30.2 mm

- Remove special tool 3459.

Calculating measurement "b"

- Push piston into ATF pump onto stop.
- Place paper gasket onto ATF Pump.



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- -> Place straightedge "B" onto stator support (arrow) and measure with depth gauge "A" to gasket of pump flange.

Example:

Reading	40.1 mm
- Straightedge	19.5 mm
= Calculated size "b"	20.6 mm

x = a - b - 3.6 mm

= 30.2 mm - 20.6 mm - 3.6 mm = 6.0 mm

- Determine thickness of outer plate(s) according to table =>Page 107 . Determine Part No.

=> Parts catalogue

Table of outer plates -D-

Gap "x" (mm)	Outer plate(s) (mm)
4.25 ... 4.49	2.75
4.50 ... 4.74	3.00
4.75 ... 4.99	3.25
5.00 ... 5.24	3.50
5.25 ... 5.49	3.75
5.50 ... 5.74	2.00 + 2.00
5.75 ... 5.99	2.00 + 2.25
6.00 ... 6.24	2.25 + 2.25

Gap "x" (mm)	Outer plate(s) (mm)
6.25 ... 6.49	2.25 + 2.50
6.50 ... 6.74	2.50 + 2.50
6.75 ... 7.00	2.50 + 2.75

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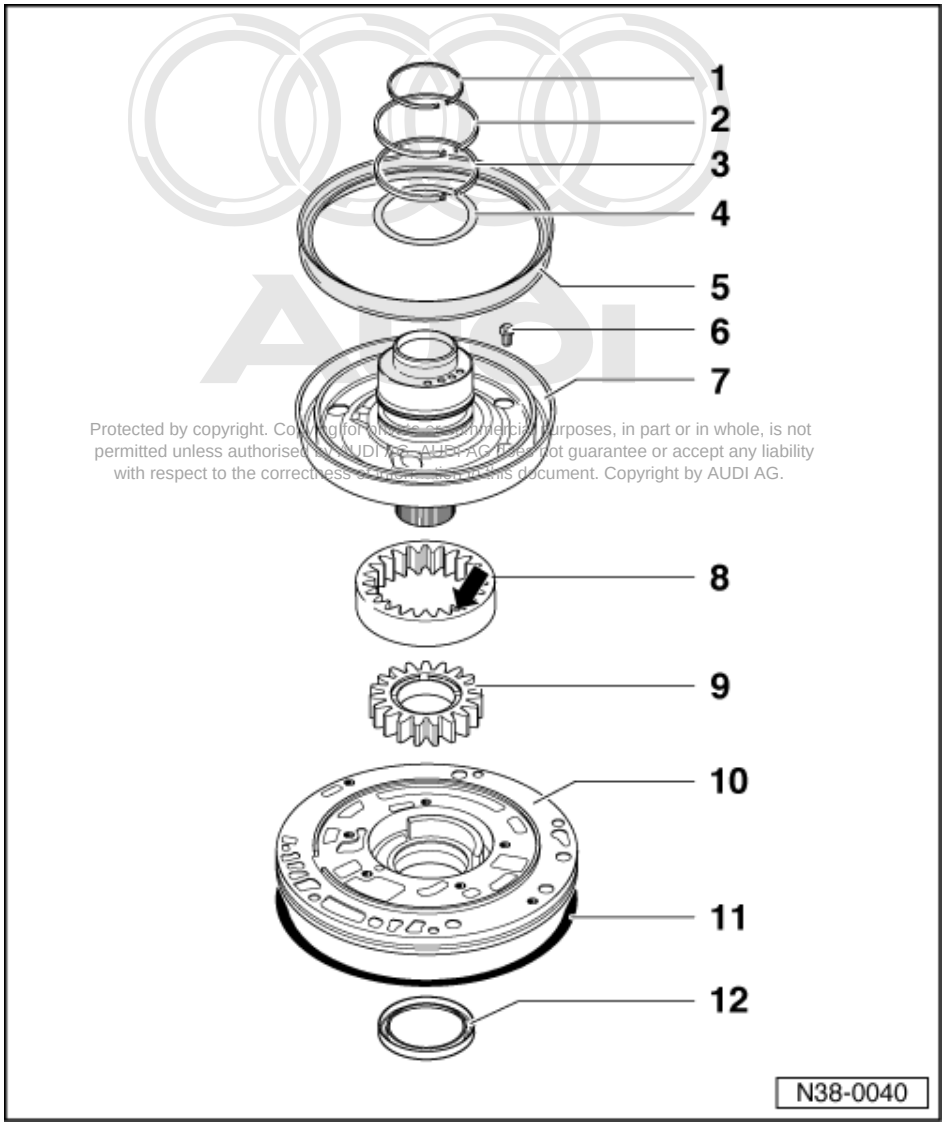
38 - Gears, Hydraulic controls

1 - Dismantling and assembling ATF pump

1.1 - Dismantling and assembling ATF pump



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Note:

Select replacement parts for the ATF pump and the ATF pump itself according to the gearbox code letters.

1 Piston ring

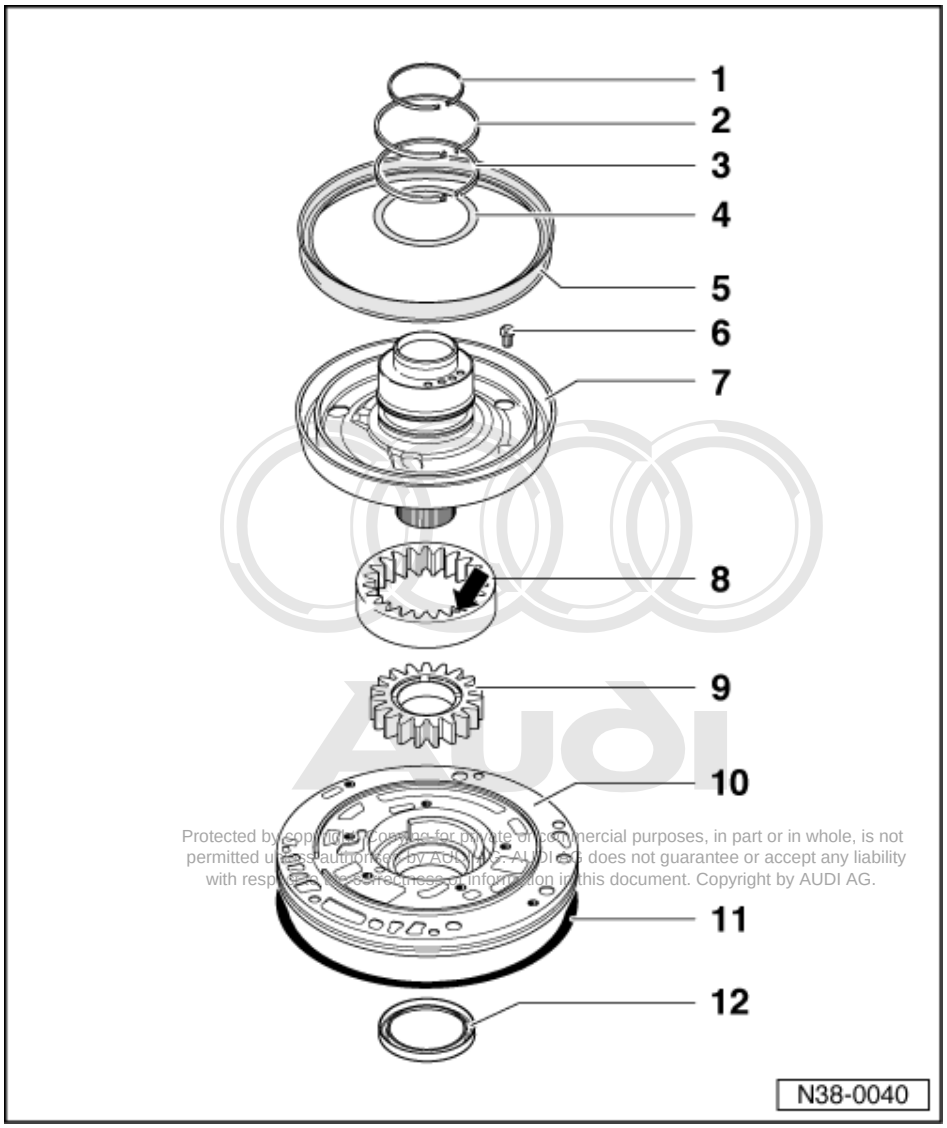
- Check that it is correctly located
  =>Fig. 112
- Removing and installing
  =>Fig. 112

2 Piston ring

- Check that it is correctly located
  =>Fig. 112
- Removing and installing
  =>Fig. 112

3 Piston ring

- Check that it is correctly located
  =>Fig. 112
- Removing and installing
  =>Fig. 112



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4 Thrust washer

5 Piston

- Sealing lips are vulcanised to the piston
- To remove piston, use screwdriver to lever out of stator support at several points
- Moisten sealing lips with ATF before inserting
- Fitting location: sealing lip faces towards stator support
- Turn piston slightly when installing

6 Bolt - 10 Nm

- Then turn 45° further

7 Stator support

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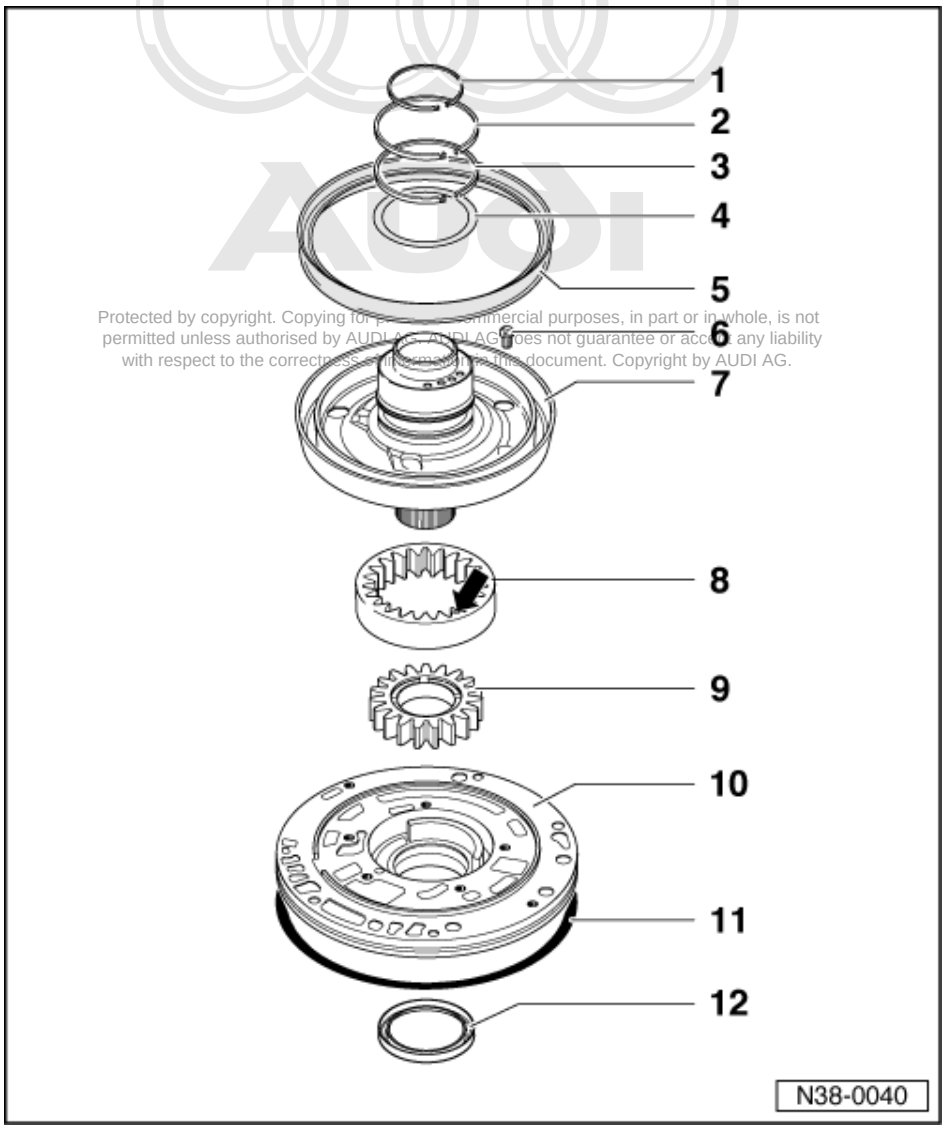


8 Outer gear

- Installation position: manufacturer's mark -arrow- facing stator support
- If outer gear is incorrectly installed, the ATF pump may not operate freely in the installed position

9 Inner gear

- Larger shoulder faces toward stator support

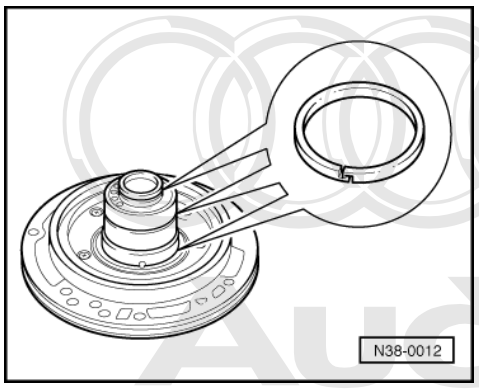
10 Housing for ATF pump

11 O-ring

- Renew

12 Torque converter oil seal

- Removing and installing
=>Page 9



-> Fig.1 Checking that the piston rings are correctly located

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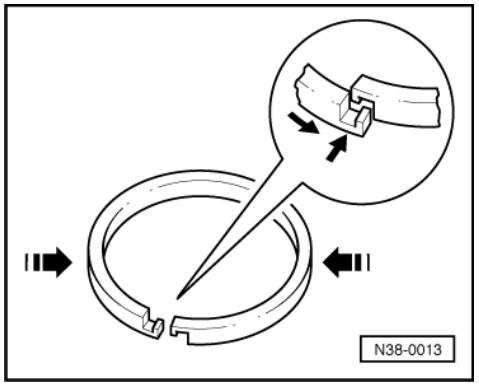
- Ensure that the ends of the piston rings are hooked together.



-> Fig.2 Removing and installing piston ring

Removing

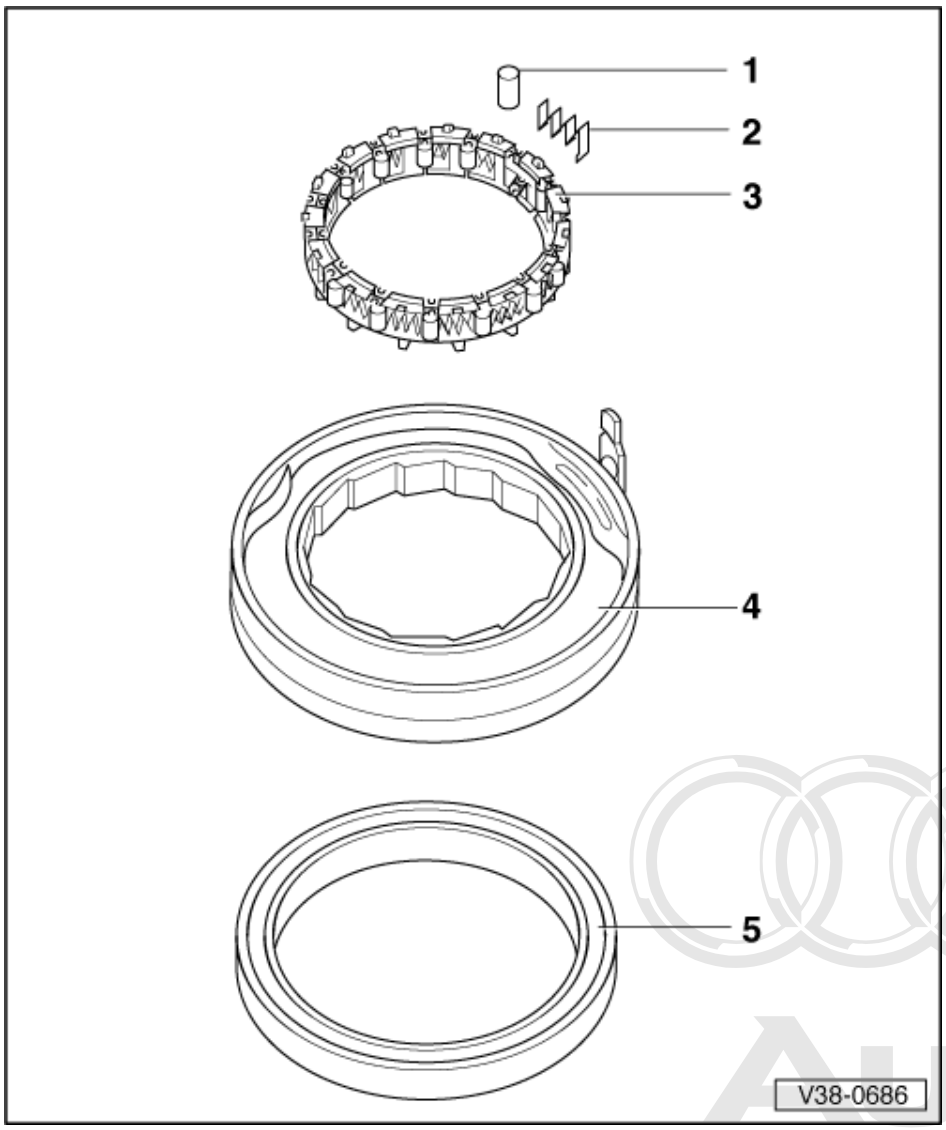
- Press ends of piston ring together and release by hand.
- Press two ends of piston ring apart and remove; do not twist piston ring out of groove on one side.

Installing

- Place piston ring in groove.
- To hook ends together press sides of ring in and guide ends over one another.

2 - Dismantling and assembling free wheel with -B1- piston

2.1 - Dismantling and assembling free wheel with -B1- piston



1 Rollers
- Installing
  =>Fig. 114

2 Springs
- Installing
  =>Fig. 114

3 Cage
- Removing and installing
  =>Fig. 114
- Installation position
  =>Fig. 115

4 Outer ring

5 Piston
- Sealing lips are vulcanised to the piston
- To remove, use screwdriver to lever out of outer ring at several points
- Moisten sealing lips with ATF before installing
- Installation position

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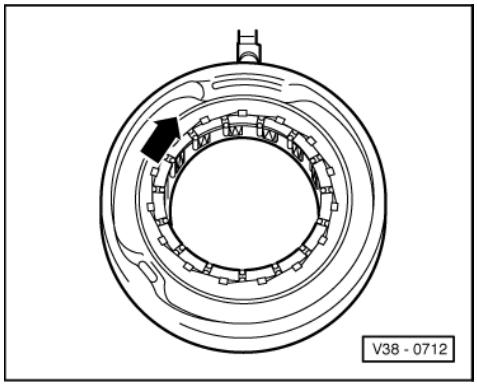
=>Fig. 115



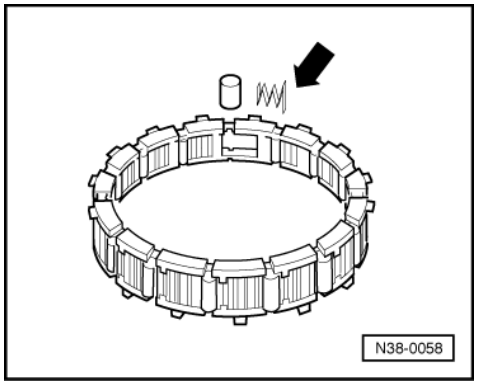
-> Fig.1 Removing and installing cage

Removing

- Turn cage to the left as far as the stop.
- Remove cage by pressing it up and out of the outer ring

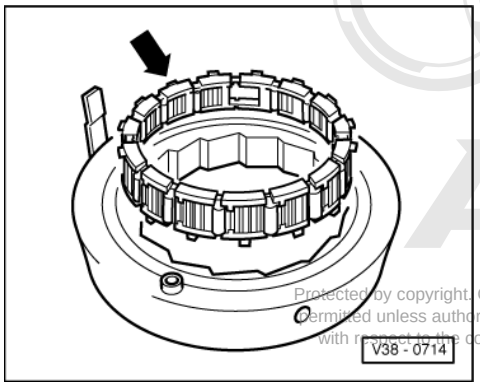
Installing

- Insert cage into outer ring.
  - Installation position=>Fig. 115
- To secure cage, turn it to the right as far as the stop -arrow-.



-> Fig.2 Installing rollers and springs

- Insert springs so that the longer ends of the springs -arrow- engage in the cage.
- Then insert roller between cage and spring.



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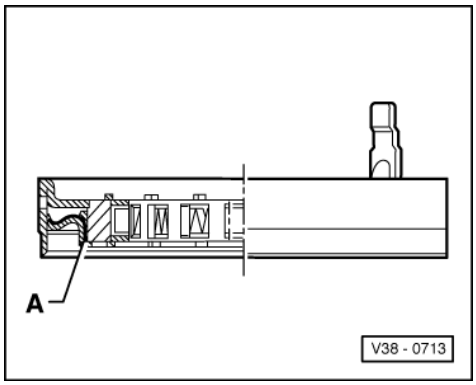
-> Fig.3 Fitting location of cage in outer ring

- Install with large lugs (arrow) facing up.



-> Fig.4 Installed position of piston

- Insert piston -A- as shown.

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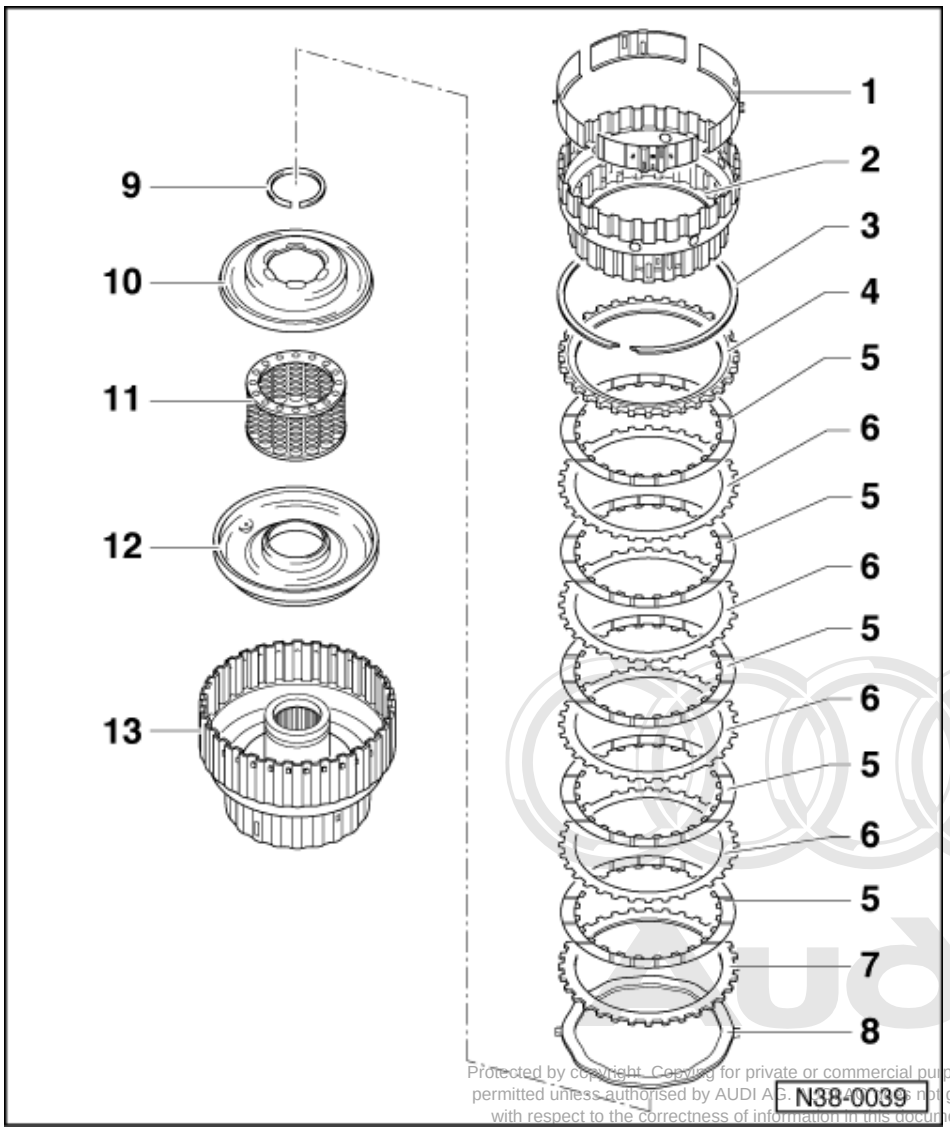
3 - Dismantling and assembling 1st to 3rd gear clutch -K1-

3.1 - Dismantling and assembling 1st to 3rd gear clutch -K1-



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Note:

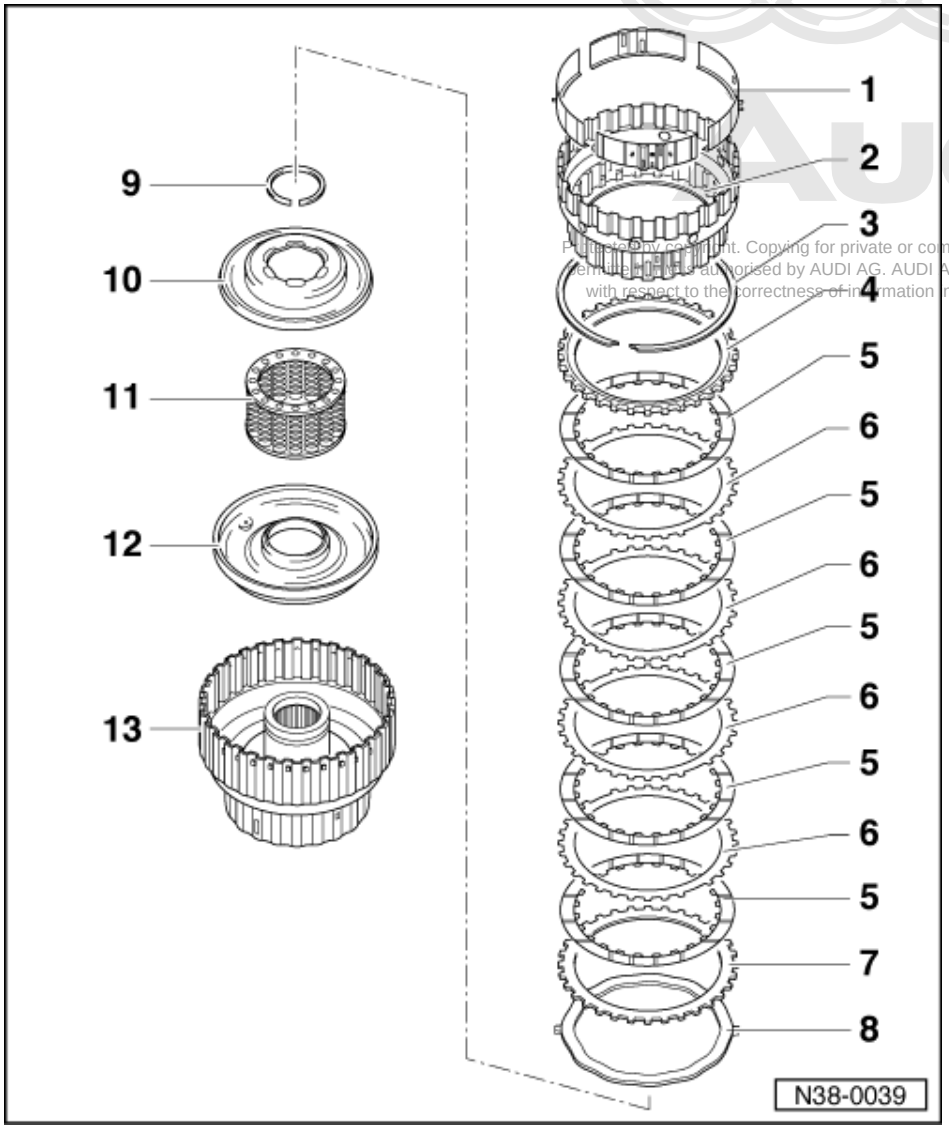
Only when cleaning or carrying out visual check the clutch must be dismantled.

1 Supporting ring
- 4-piece, unclip from inner plate carrier
- Inserting
  =>Fig. 120

2 Inner plate carrier
- Inserting
  =>Fig. 121
- Assembling
  =>Fig. 120

3 Circlip
- Different thicknesses
- Do not mix up circlips for different clutches

- Mark after removing and insert in same position



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4 Thrust plate

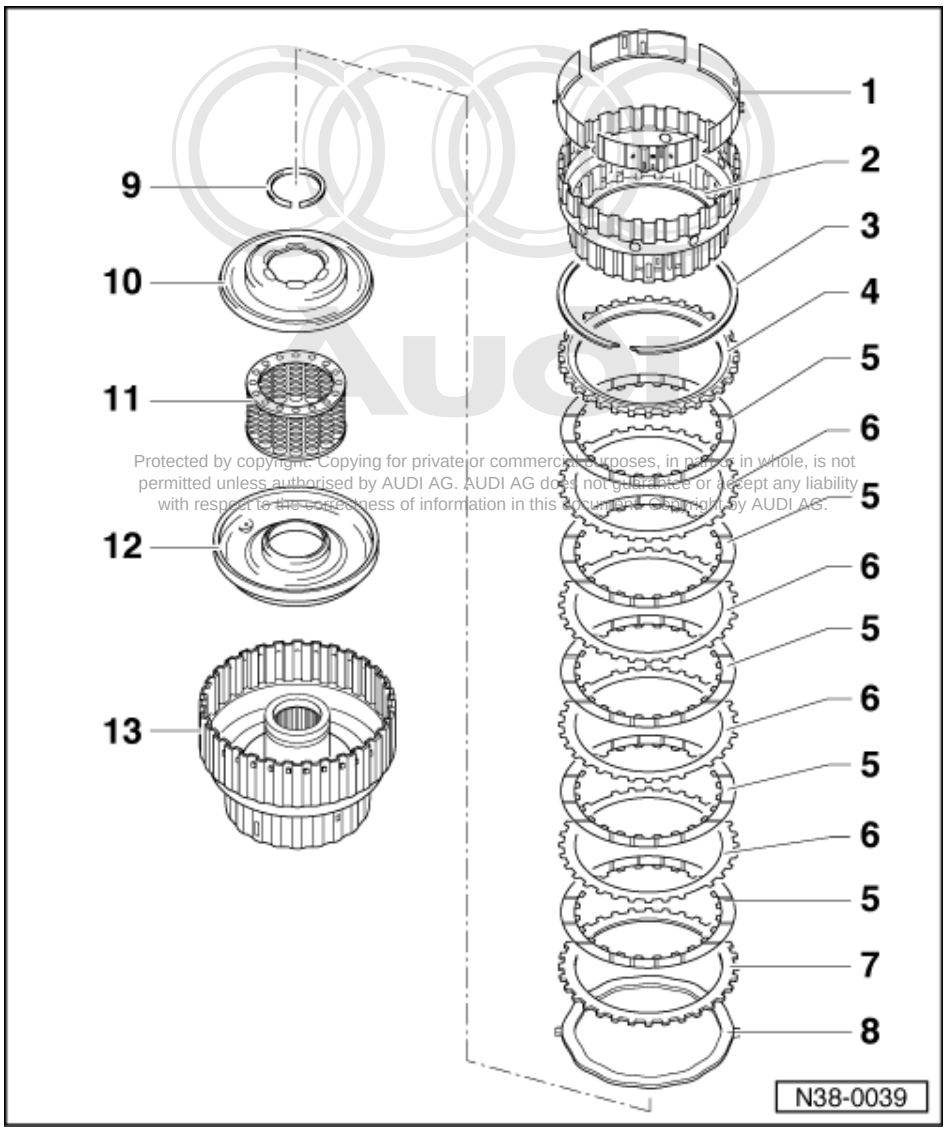
- Install with smooth side facing toward inner plate
- Insert together with inner plate carrier
  => Fig. 120

5 Inner plate

- Quantity=> from Page 2
- Installing
  => Fig. 120
- Soak new inner plates in ATF for 15 minutes before installing

6 Outer plate

- 1.5 mm thick
- Quantity=> from Page 2
- Installing
  => Fig. 120



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7 Outer plate

- 2.0 mm thick
- Installing
  => Fig. 120

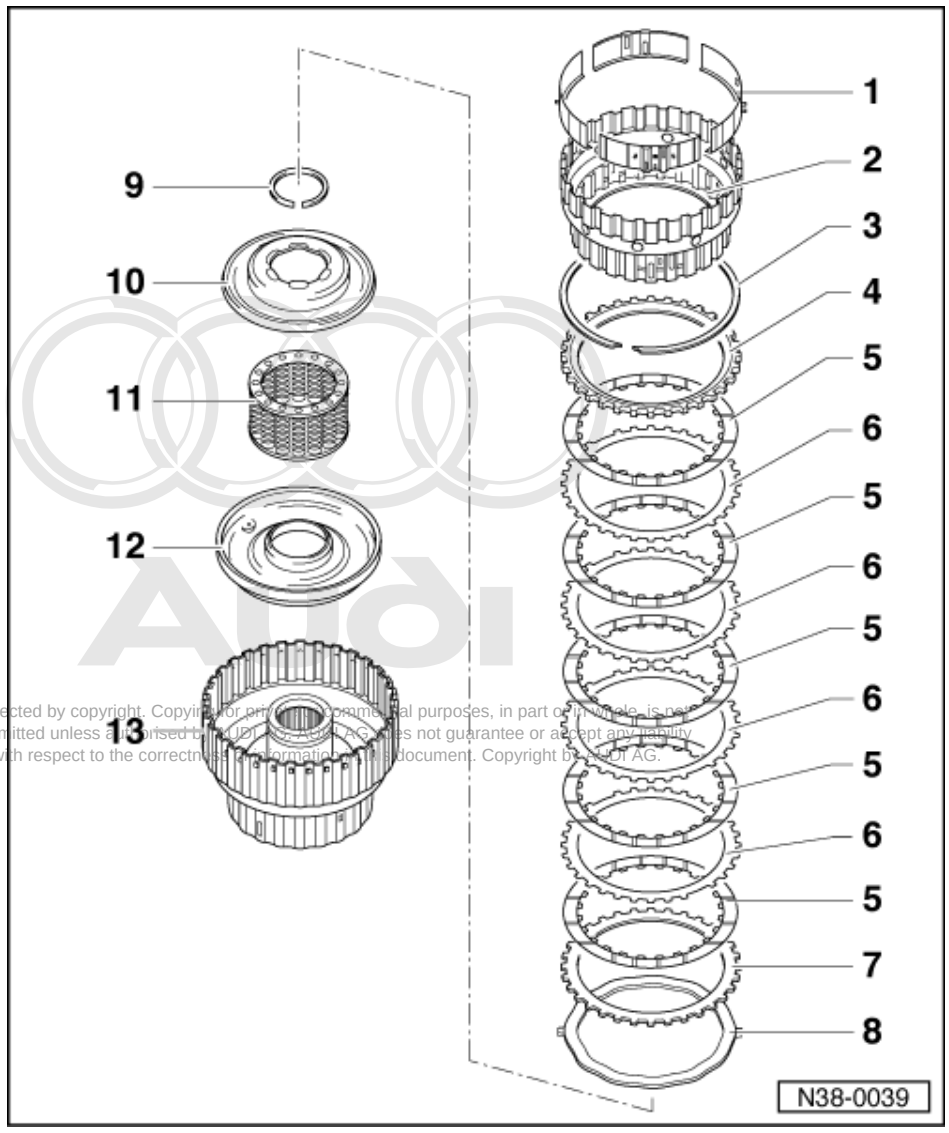
8 Corrugated washer

9 Circlip

- Removing and installing
  =>Fig. 120
- Do not mix up circlips for different clutches
- Mark after removing and insert in same position

10 Piston cap

- Sealing lips are vulcanised to cap
- Moisten sealing lips with ATF before installing
- Turn cap slightly when installing



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11 Intermediate spring ring

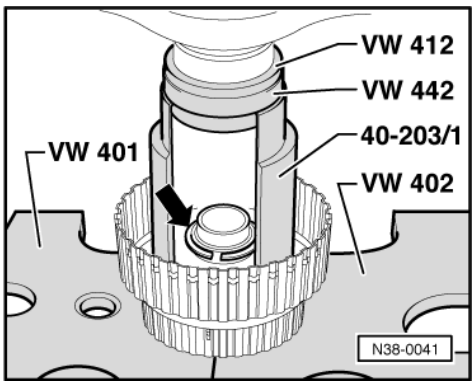
- With spring supporting shell and compression springs

12 Piston

- Use a screwdriver to lever piston out of clutch housing at several points
- Sealing lips are vulcanised to piston
- Moisten sealing lips with ATF before installing
- Turn piston slightly when installing

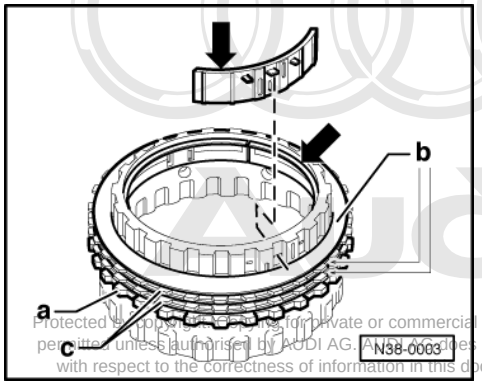
13 Clutch housing

- Before fitting inner plate carrier, insert corrugated washer (Item 8), and inner and outer plates in clutch housing =>Fig. 121



-> Fig.1 Removing and installing circlip

- Press piston cap with intermediate spring ring down far enough for the circlip (arrow) to be inserted in the groove.



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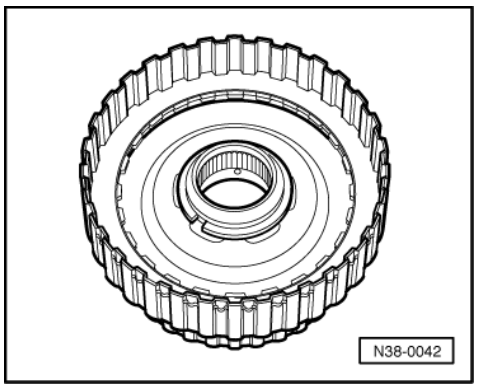
-> Fig.2 Fitting thrust plate and plates onto inner plate carrier

- Install thrust plate -a- with smooth side facing inner plate and stepped side towards inner plate carrier.
- Install 3 inner plates -b- and 2 outer plates -c- (1.5 mm).
- Clip in supporting ring with step facing upwards (arrows).

Note:

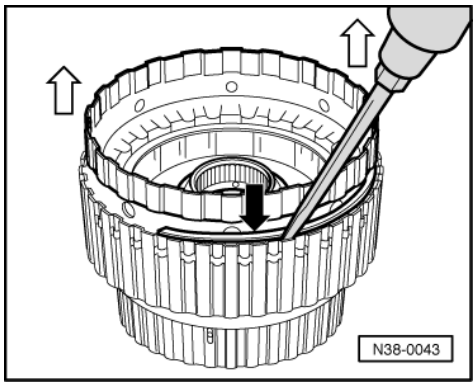
Insert locating lugs correctly.

- Install corrugated washer and remaining plates in clutch housing
  => Fig. 121 .



-> Fig.3 Installing corrugated washer and inner and outer plates in clutch housing

- First insert corrugated spring washer.
- Insert 2 mm thick outer plate.
- Insert remaining inner and outer plates.



-> Fig.4 Inserting inner plate carrier and installing circlip

- Lift inner plate carrier slightly (white arrows) to install circlip (black arrow).

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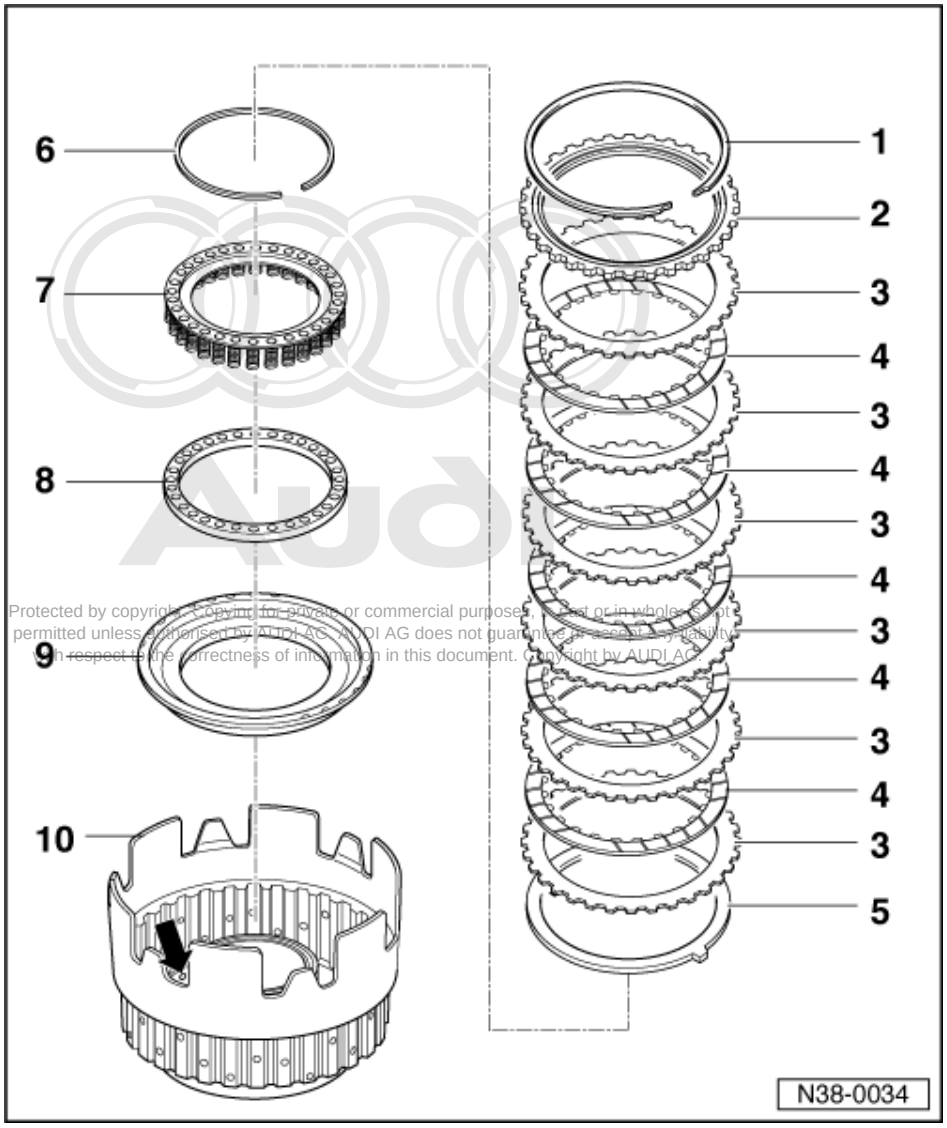
4 - Dismantling and assembling reverse gear clutch -K2-

4.1 - Dismantling and assembling reverse gear clutch -K2-



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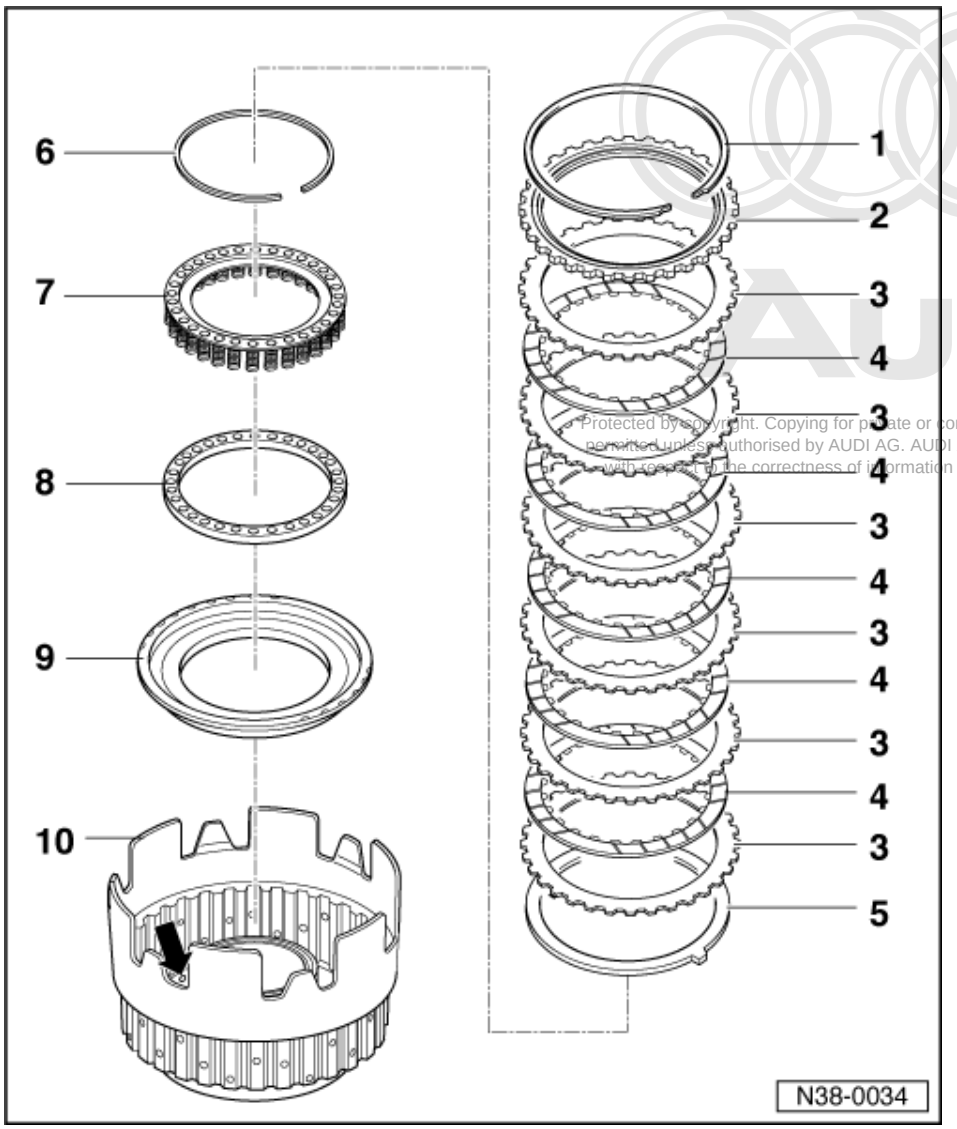
Notes:

- The clutch should only be dismantled for cleaning and for visual inspection.
- Be careful not to damage the ball valve -arrow- when repairing the clutch.

1 Circlip
- Different thickness
- Do not mix up circlips for different clutches
- Mark after removing and insert in same position

2 Thrust plate
- Smooth side faces toward plates



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3 Outer plate

- Quantity=> from Page 2

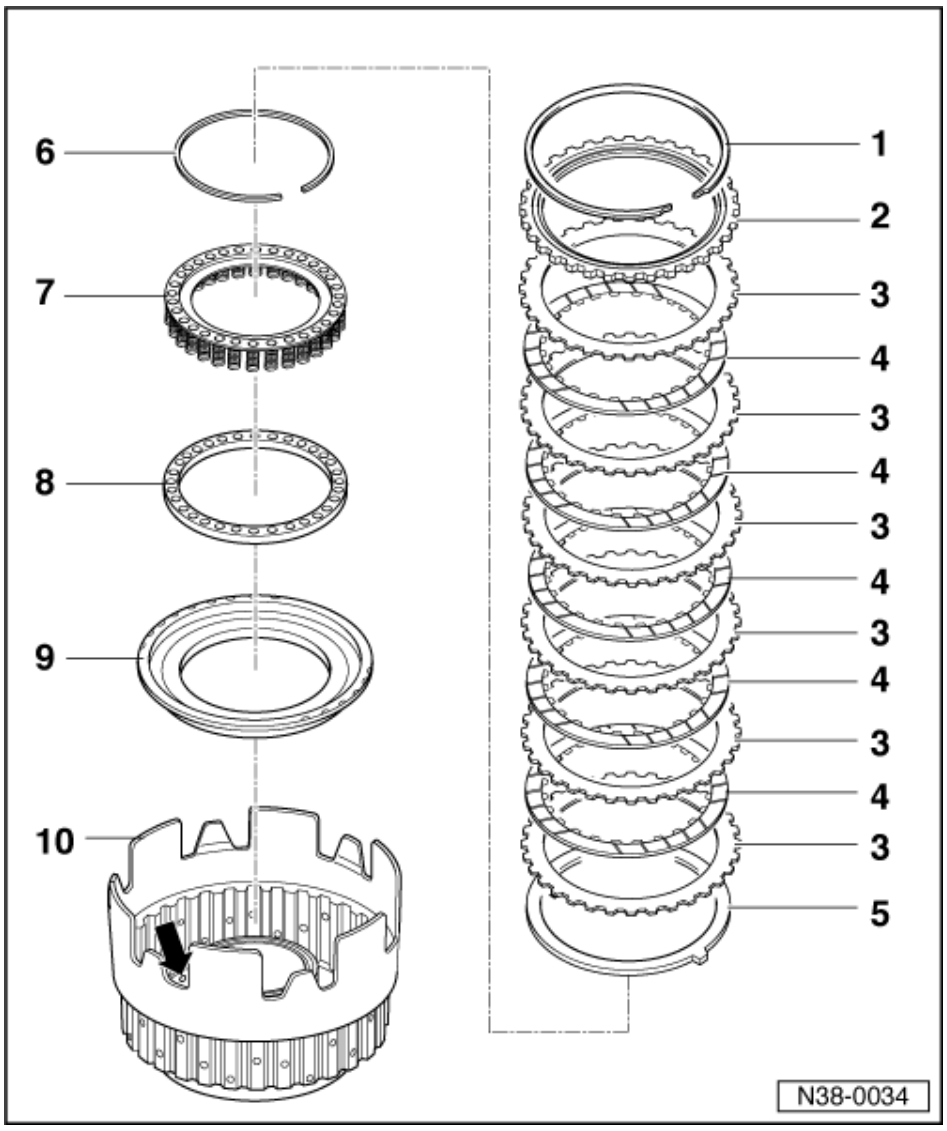
4 Inner plate

- Quantity=> from Page 2
- Soak new inner plates in ATF for 15 minutes before installing

5 Corrugated washer

6 Circlip

- Removing and installing
  => Fig. 125
- Installation position
  => Fig. 125
- Different thickness
- Do not mix up circlips for different clutches
- Mark after removing and insert in same position



7 Spring supporting plate

- With springs
- Installation position
  => Fig. 125
- Before installing, fit together with spring supporting ring. Ensure springs are correctly located.

8 Spring supporting ring

9 Piston

- To remove, use a screwdriver to lever out of clutch housing at several points.
- Sealing lips are vulcanised to piston
- Moisten sealing lips with ATF before installing
- Turn piston slightly and keep straight when installing

10 Clutch housing

- With ball valve -arrow-

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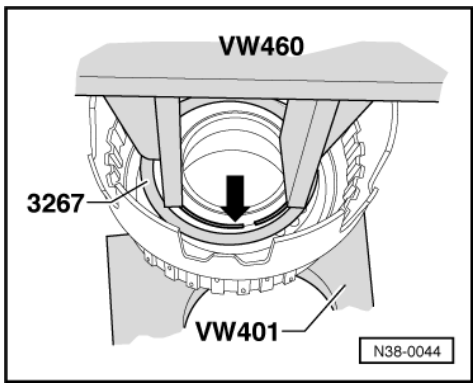
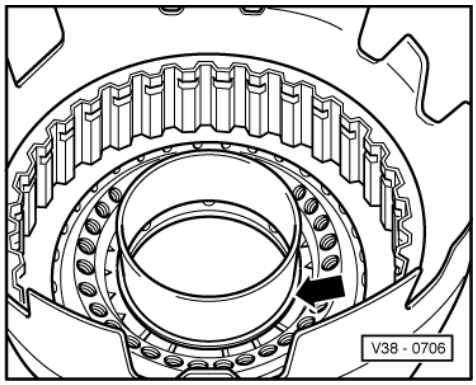


-> Fig.1 Removing and installing circlip

- Using 3267, carefully press down spring supporting plate just far enough to remove and install the circlip -arrow-.

Note:

Do not damage clutch housing ball valve.



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-> Fig.2 Installation position of spring supporting plate, checking circlip

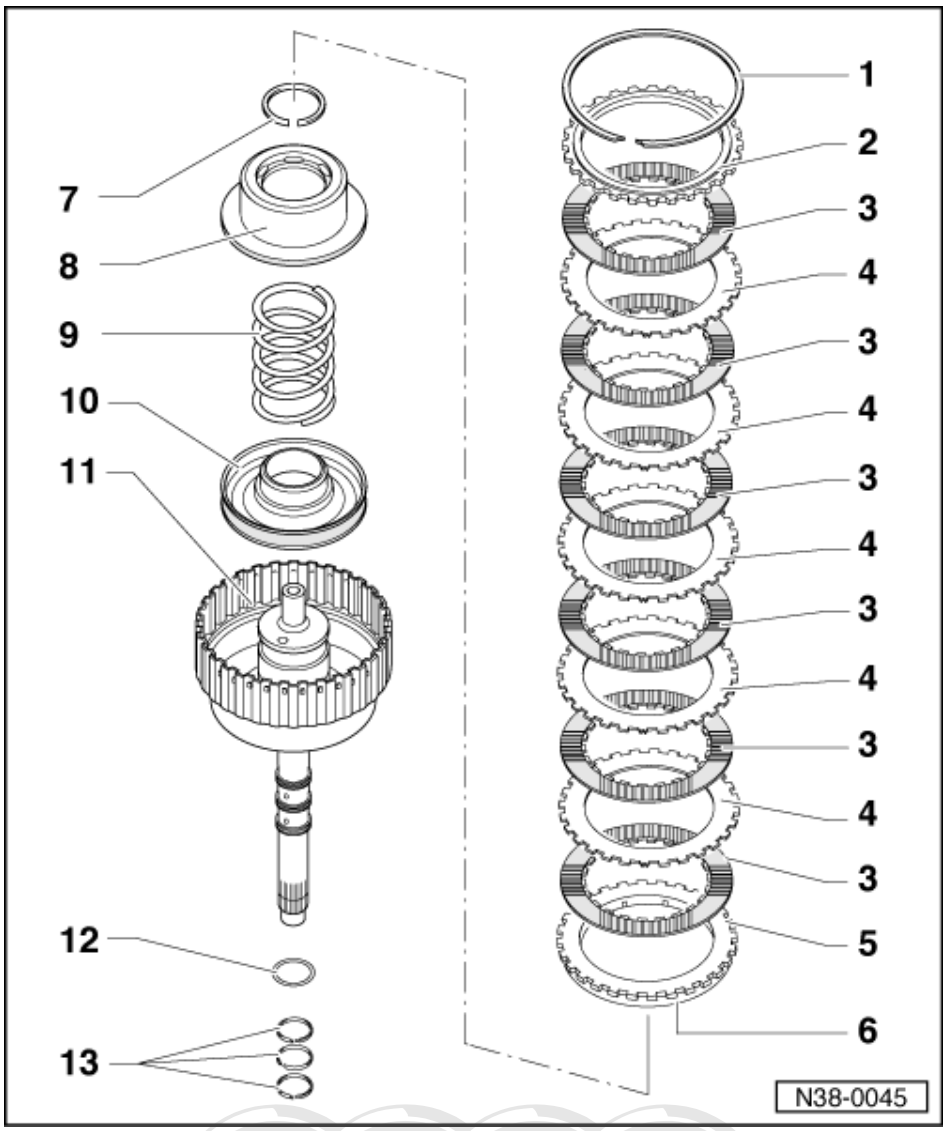
Circlip (arrow) must be seated in the groove of clutch housing. Spring supporting plate must be centred relative to hub.

Note:

Do not confuse the groove in the clutch housing with the shoulder on the shaft.

5 - Dismantling and assembling 3rd and 4th gear clutch -K3- with turbine shaft

5.1 - Dismantling and assembling 3rd and 4th gear clutch -K3- with turbine shaft



Note:

The clutch should only be dismantled for cleaning or visual inspection.

1 **Circlip**
- Different thickness
- Do not mix up circlips for different clutches
- Mark after removing and insert at same point

2 **Thrust plate**
- Fitting location: smooth side facing plates

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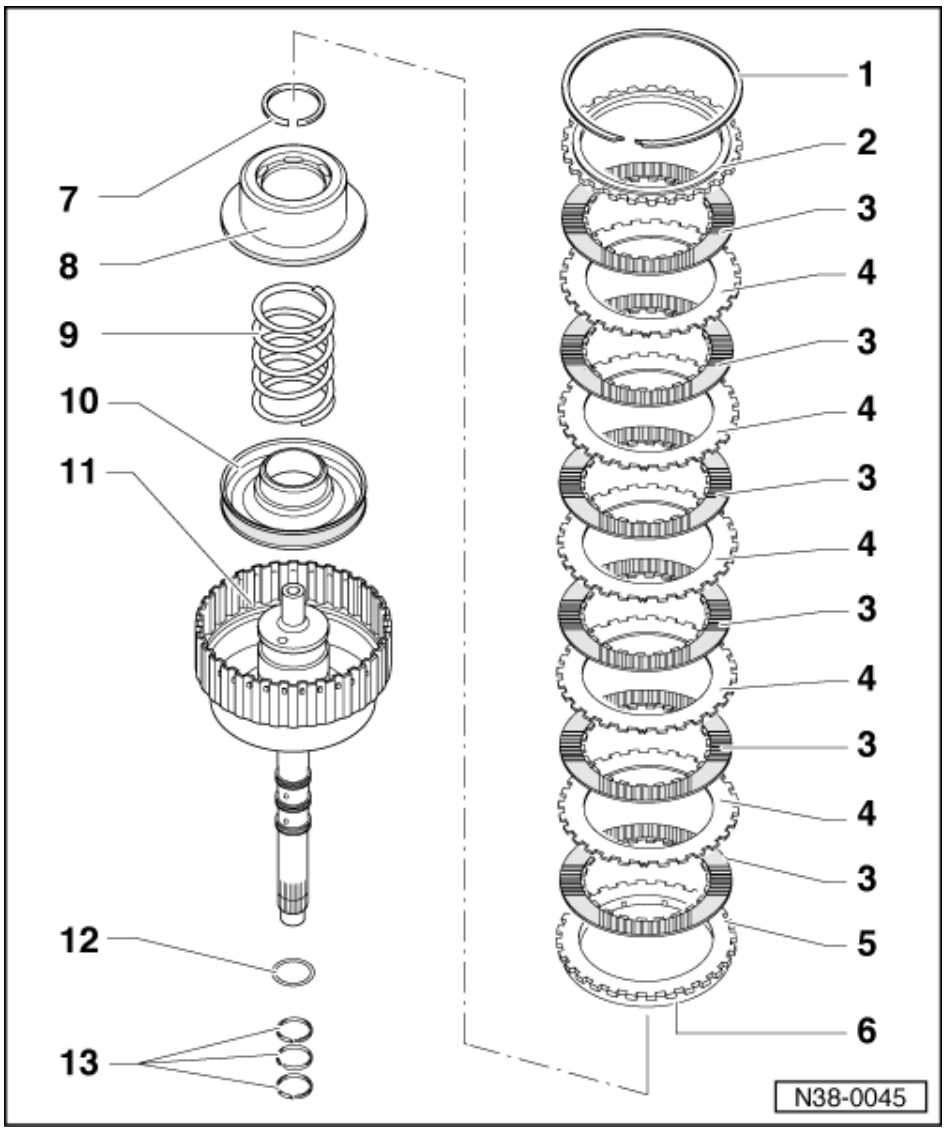

3 Inner plate
- Quantity=>from Page 2
- Soak new plates in ATF for 15 minutes before installing

4 Outer plate
- Quantity=>from Page 2

5 Pressure plate
- Peened to corrugated washer (item 6)
- Install with peened corrugated washer facing piston

6 Corrugated washer
- Peened to pressure plate (item 5)

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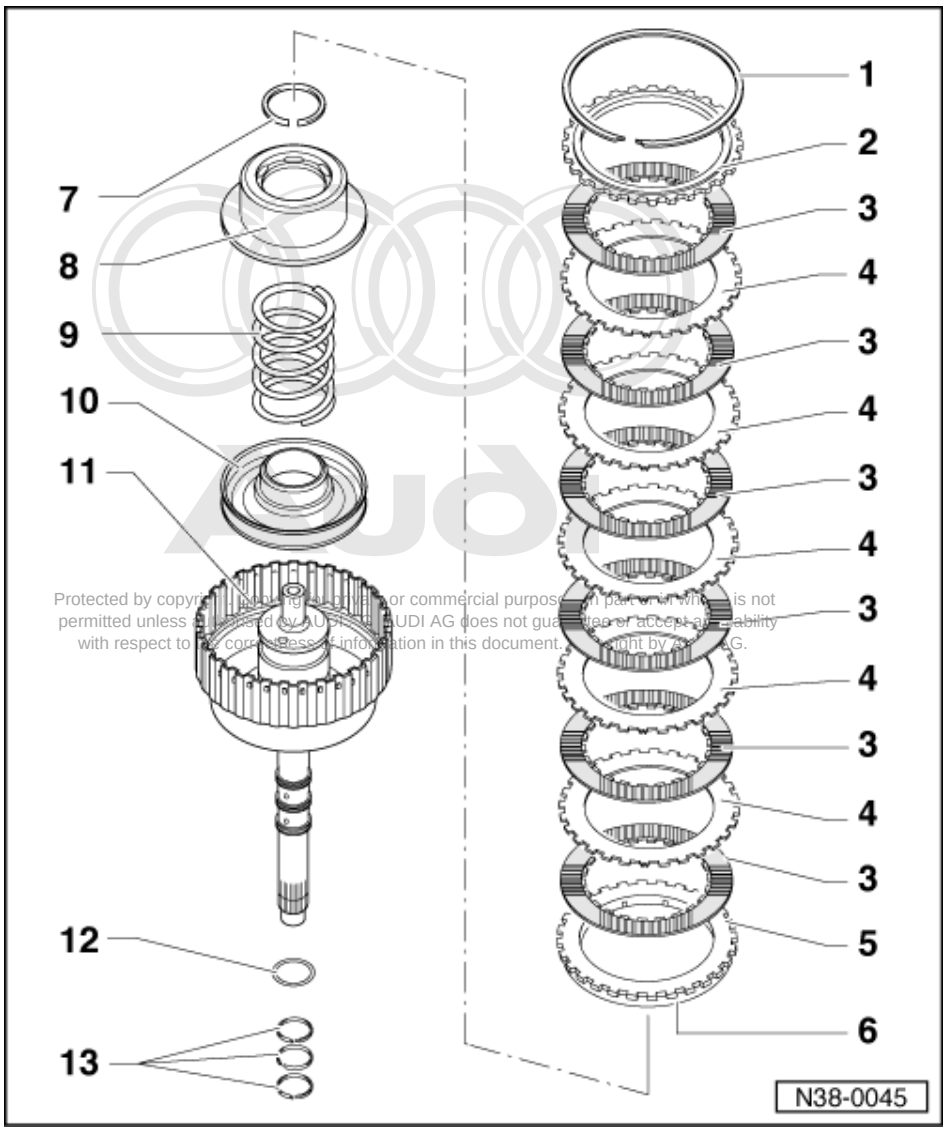

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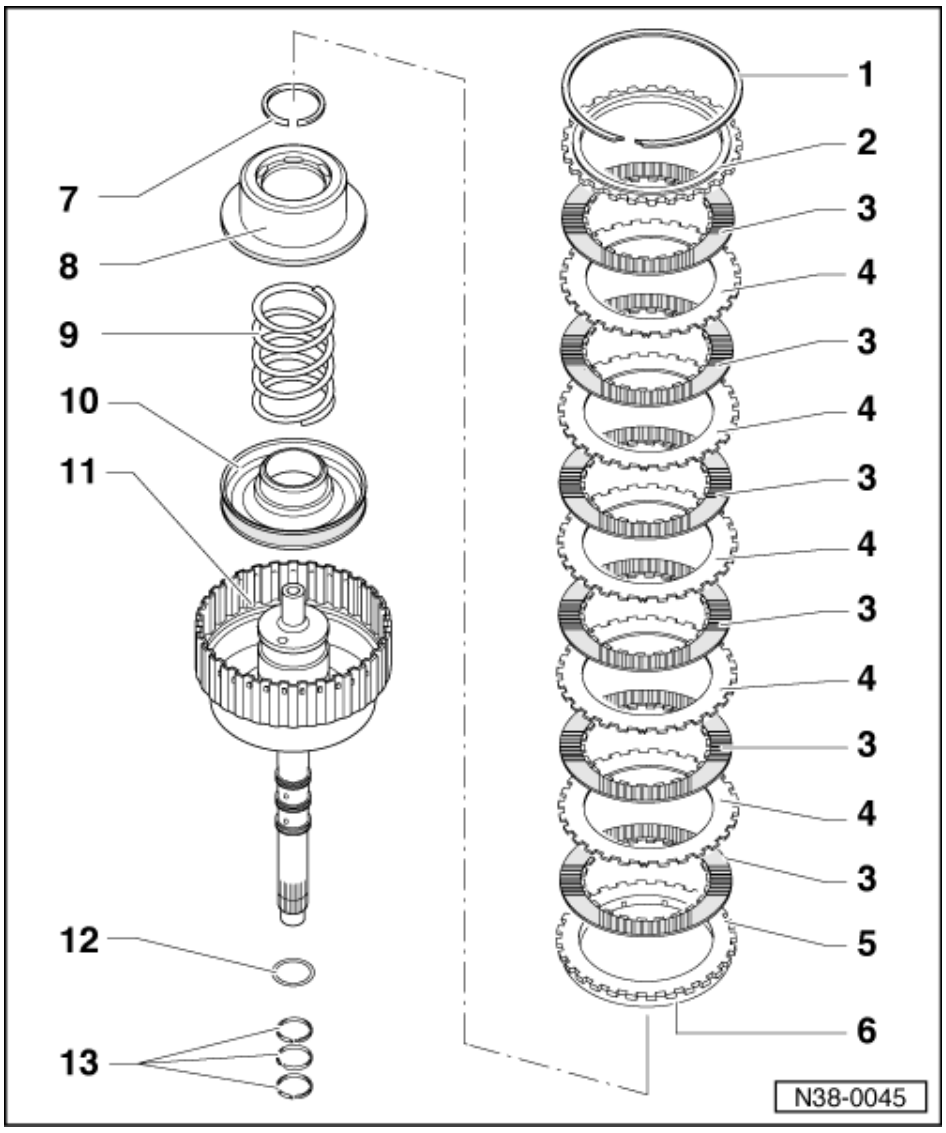
7 Circlip

- Removing and installing
  =>Fig. 131
- Different thickness
- Do not mix up circlips for different clutches
- Mark after removing and insert at same point

8 Piston cap

- Is under strong spring pressure
- Sealing lips are vulcanised to piston cap
- Moisten with ATF before installing
- Turn piston cap slightly when installing
- Removing and installing
  =>Fig. 131



9 Spring

- Seat between piston and piston cap

10 Piston

- Sealing lips are vulcanised to piston
- Moisten with ATF before installing
- Turn piston slightly when installing

11 Clutch housing with turbine shaft

- Height varies according to number of inner and outer plates
- Different versions according to gearbox code letters

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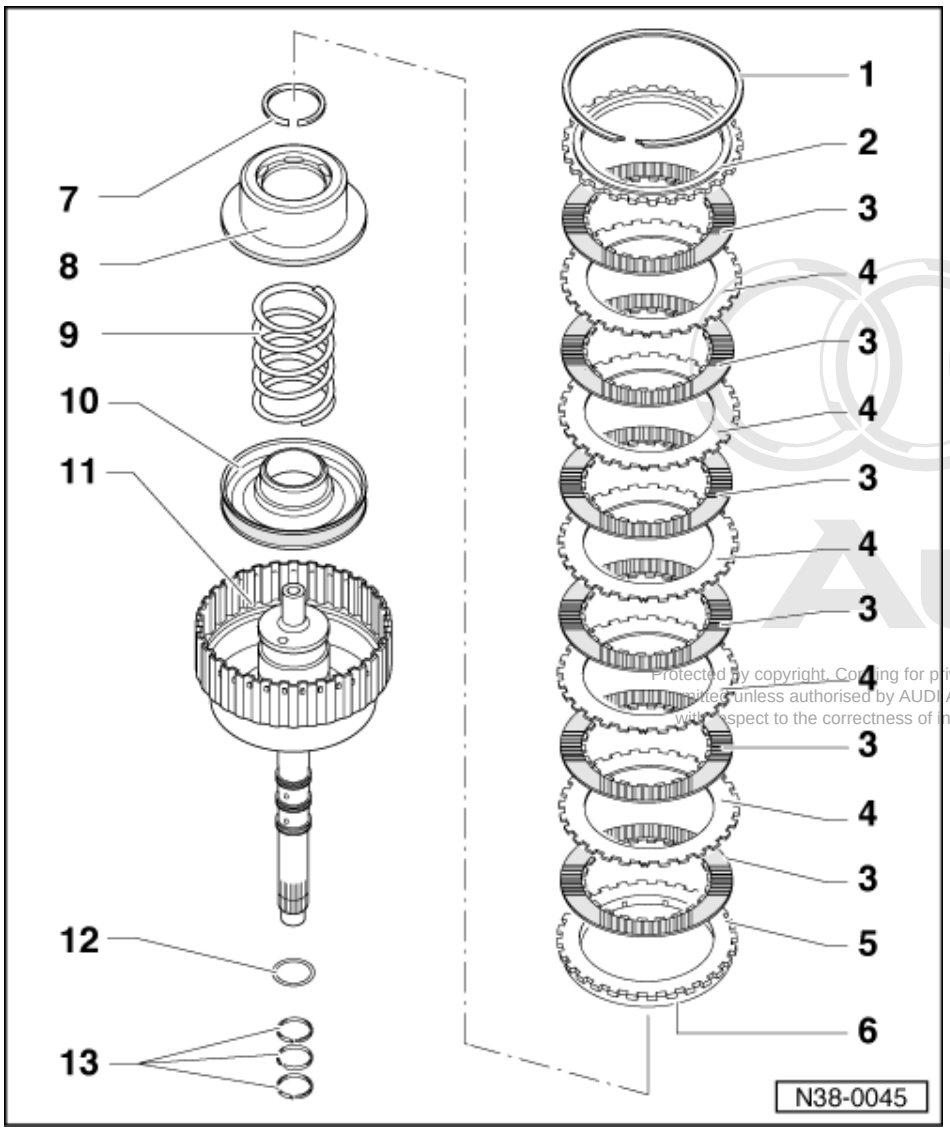

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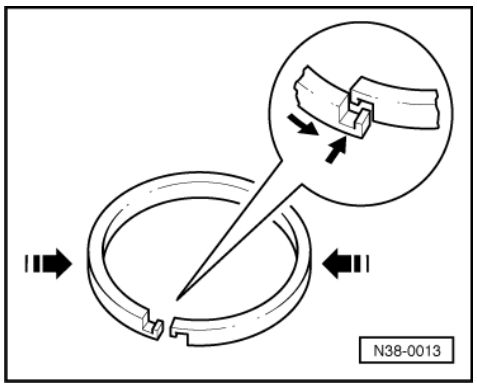
12 O-ring

- Renew
- Installing
  =>Fig. 132

13 Piston ring

- Removing and installing
  =>Fig. 131
- Check that it is correctly located
  => Fig. 132



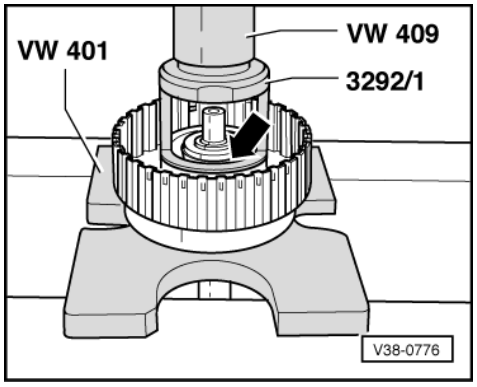
-> Fig1 Removing and installing piston ring

Removing

- Press piston ring together and release by hand
- Open out piston ring on both sides and take off; do not twist out of groove on one side.

Installing

- Place piston ring in groove.
- To hook ends together press sides of ring in and guide ends over one another.



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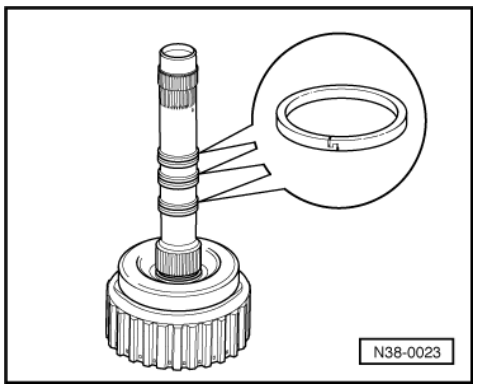
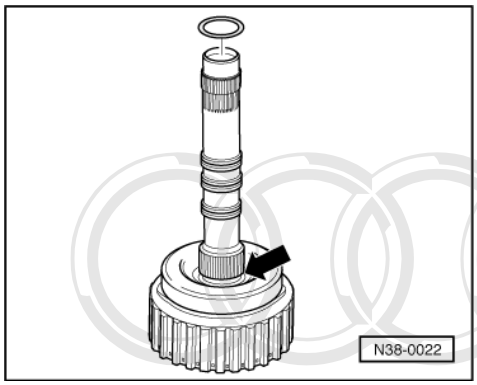
-> Fig.2 Removing and installing circlip

- Press piston cap down carefully until the circlip -arrow- can be removed or installed.



-> Fig.3 Checking seating of piston rings

- Ensure that the ends of the piston rings are hooked together.



-> Fig.4 Installing O-ring

- Insert O-ring in the groove in the turbine shaft -arrow-.

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6 - Removing and installing valve body

6.1 - Removing and installing valve body

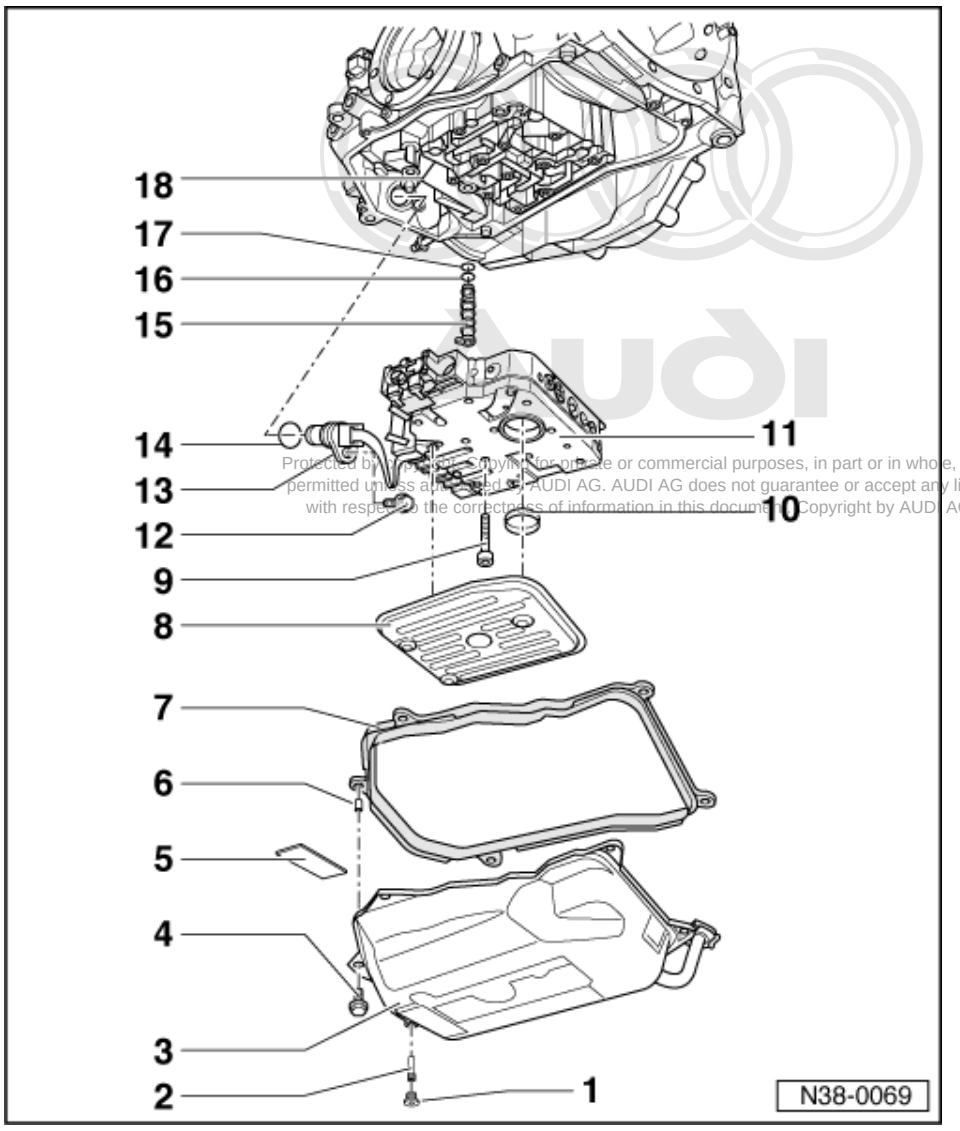
Caution Do not run engine or tow vehicle with oil pan removed or when ATF has been drained from the gearbox.

Notes:

- An exchange component containing all the selector elements and the valve body is available for repairing automatic gearbox 01N .
- Select the correct exchange component according to the gearbox code letters=>from Page 2 .
- Installation instructions:

=> Special information; Transmission; No. 10

- The parts shown in the following illustration can be removed with the gearbox installed.
- Always replace the valve body if it is dirty or defective.
- Rules for cleanliness when working on the automatic gearbox
  => Page 47 .
- General repair instructions=>Page 4 .
- LIghtly lubricate O-rings with ATF. Other types of lubricant can cause problems with the hydraulic actuation of the gearbox.



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1 Plug

- Always renew seal
  =>Fig. 138
- Checking ATF level and topping-up => Page 38

2 Overflow pipe

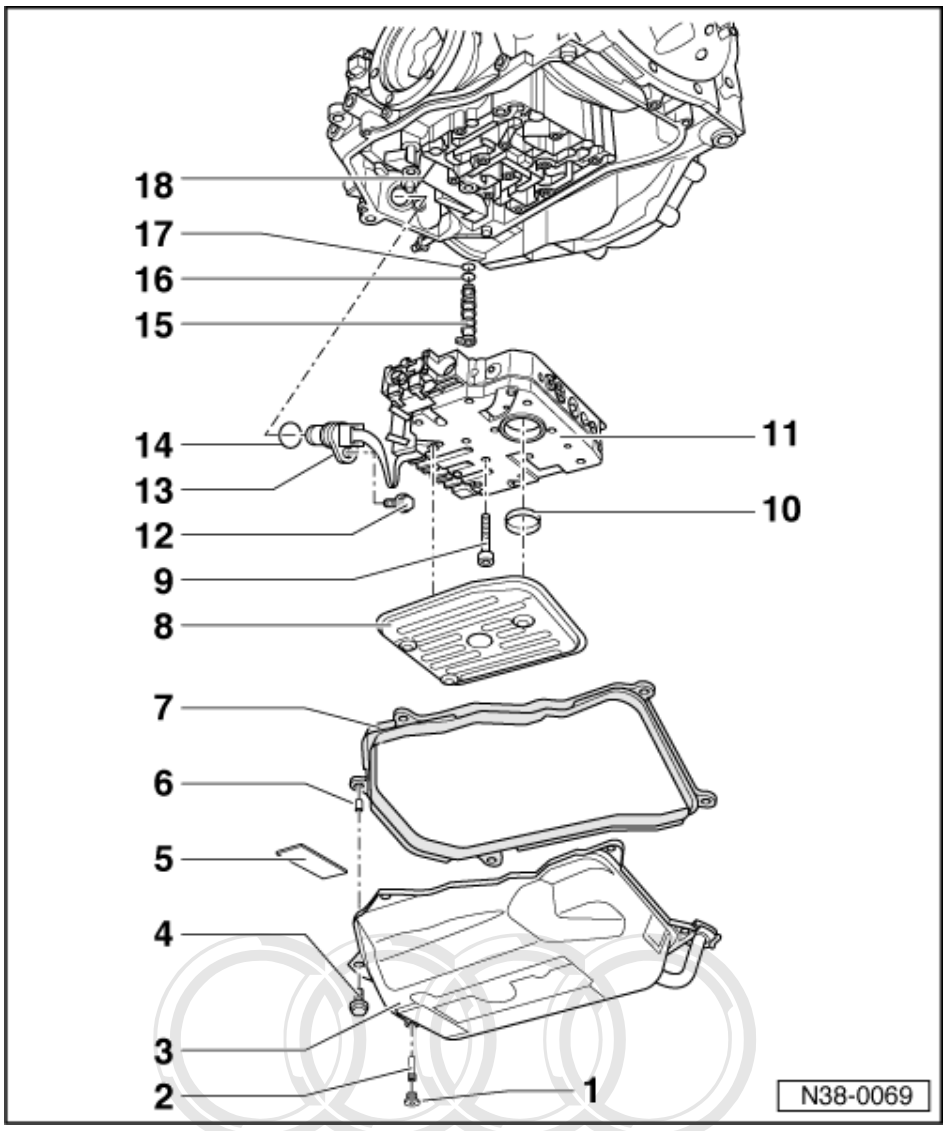
- Remove to drain ATF
  => Fig. 137
- Checking ATF level and topping-up => Page 38

3 Oil pan

- With long ATF filler pipe for 6-cylinder engine:=>Fig. 139
- Removing and installing
  => Page 139

4 Bolt - 12 Nm

- Tighten bolts for oil pan in diagonal sequence and in several stages



5 Magnet
- Insert in the recess in oil pan

6 Spacer bush
- Press into gasket

7 Gasket
- Renew
- Press spacer bushes -Item 6- into gasket

8 ATF screen
- Removing and installing
  =>Page 140

9 Bolt - 5 Nm
- For attaching valve body
- Removing=>Page 141
- Installing=>Page 142

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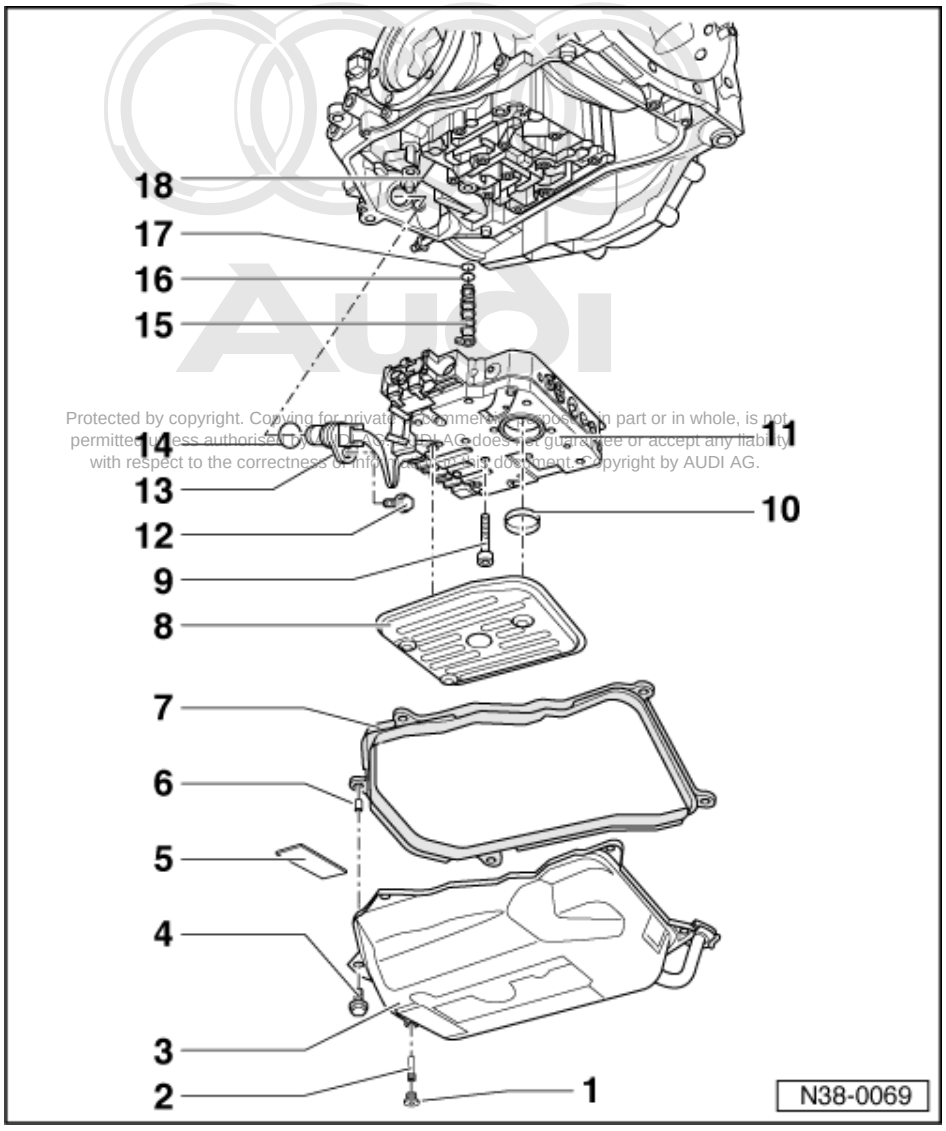

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10 Seal

- Renew
- Press onto suction collar on ATF screen

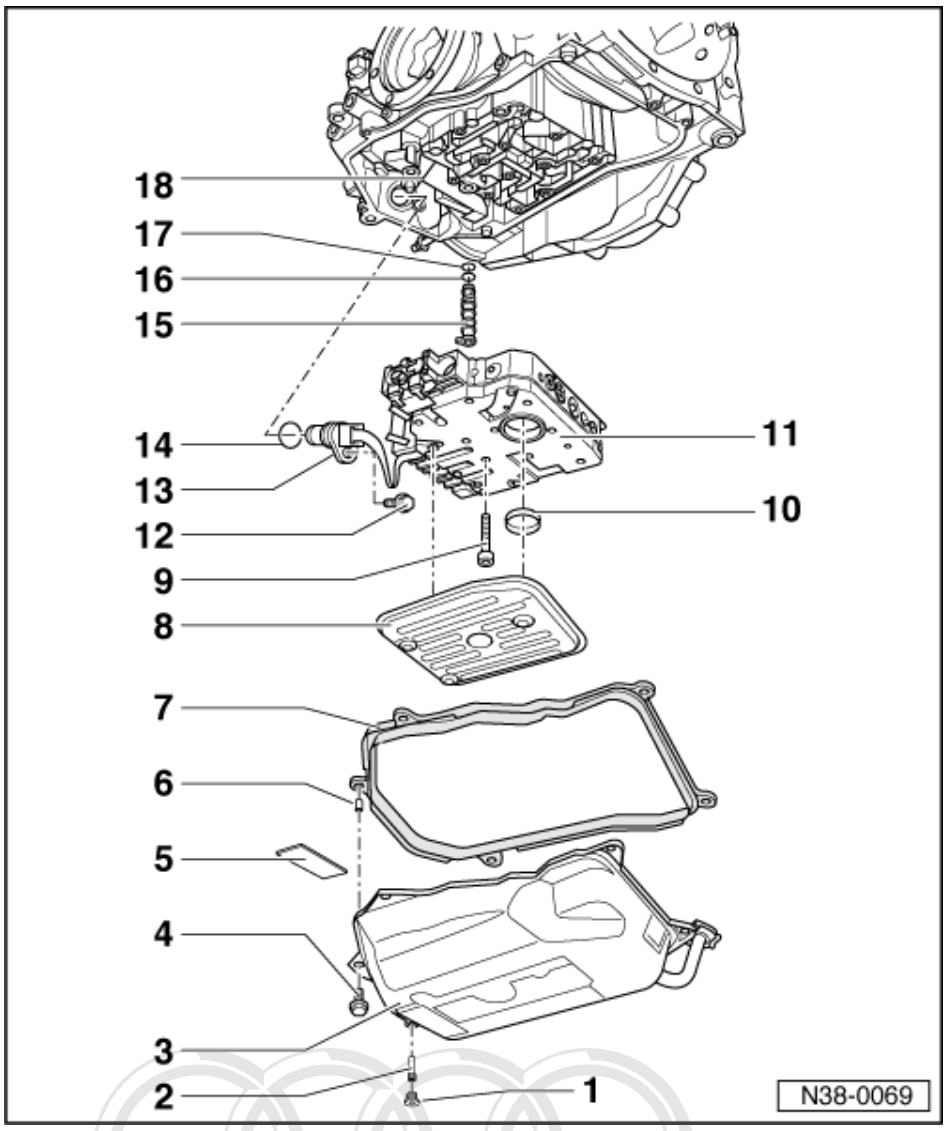
11 Valve body

- Marking
  =>Fig. 138
- Removing and installing
  =>Page 141

12 Bolt - 10 Nm

13 Conductor strip with connector for solenoid valves

- With cable transition piece and 10-pin connector
- The gearbox oil temperature (ATF) sender -G93 is integrated in the conductor strip.
- Removing and installing
  =>Page 143



14 O-ring

- For cable transition piece
- Renew

15 Sealing plug

- Take out before removing and installing free wheel
- Installation position
  =>Fig. 138
- Place O-rings onto sealing plug

16 O-ring

- Renew

17 O-ring

- Renew

18 Operating rod for manual selector valve

- Adjusting => Removing and installing valve body, Page 141

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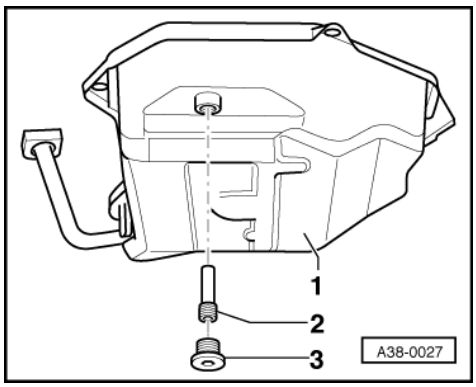
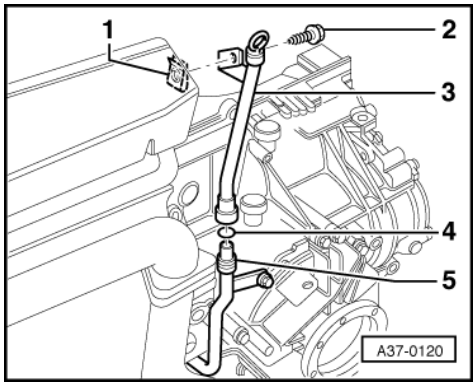


-> Fig.1 Draining ATF

Vehicles with 4-cylinder engine:

- Remove ATF inspection plug -3- and overflow pipe -2- (5 mm hexagon socket).
- Drain ATF.
- Screw overflow pipe -2- in again as far as stop (tightening torque: 2 Nm).

Vehicles with 6-cylinder engine



On vehicles with the 6-cylinder engine, the automatic gearbox has no inspection plug and no drain plug.

- Extract ATF using oil extractor V.A.G 1358 A and oil suction probe V.A.G 1358/A 1.

or

- -> Unscrew union nut at lower ATF filler pipe -5- and pull filler pipe out of oil pan.
- Drain ATF and install ATF filler pipe again (tightening torque: 80 Nm).

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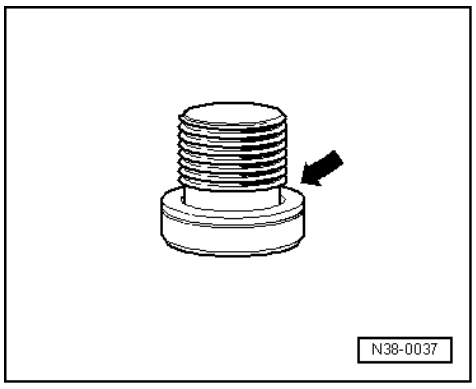
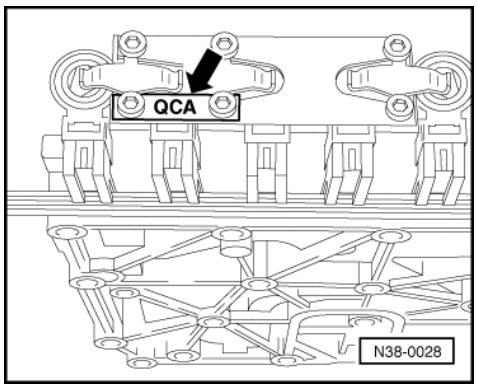


-> Fig.2 Replacing plug seal

- Cut open seal -arrow- for ATF inspection plug using side cutting pliers.
- After repairs fit new seal to plug and screw in hand-tight before filling with ATF.
- Check ATF level and top up with ATF=>Page 38 .
- Tighten ATF inspection plug to 15 Nm.



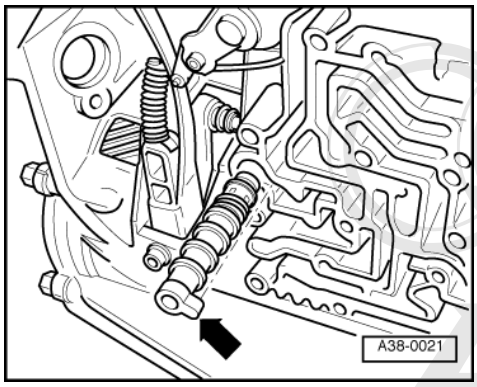
-> Fig.3 Identification of valve body

Code letters are stamped on an identifying tab. This tab must remain on the valve body.

Allocation valve body/gearbox=>from Page 2

Note:

If the valve body has no identifying tab it must remain together with the gearbox. If a new valve body is fitted, ensure that it is the correct version for the gearbox => allocation from Page 2 .



-> Fig.4 Installation position of sealing plug

- Insert sealing plug in hole in gearbox housing. The lug -arrow- is inserted into the oil channel.

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Notes:

- Pull the sealing plug out of the gearbox housing before removing and installing the free wheel. Otherwise the sealing plug and the O-rings will be damaged.
- Insert sealing plug together with 2 O-rings.

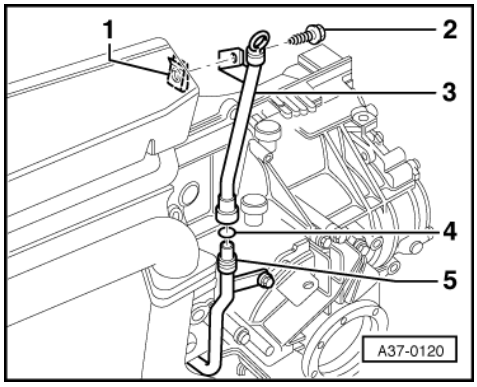

Fig.5 -> ATF filler pipe (long version with 6-cylinder engine)

1 - Speed nut
2 - Bolt - 3 Nm
3 - Upper ATF filler pipe
4 - Seal
5 - Lower ATF filler pipe

6.2 - Removing and installing oil pan

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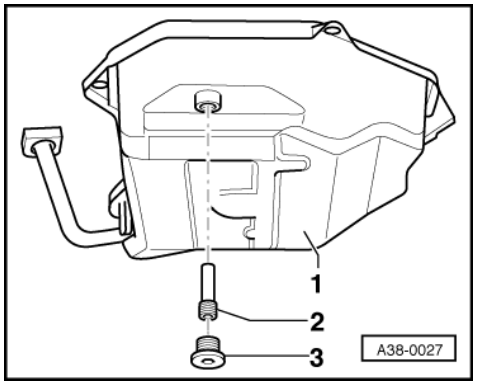
Special tools, testers and auxiliary items

- Drip tray V.A.G 1306
- Oil extractor V.A.G 1358 A with oil suction probe V.A.G 1358 A/1 (only for vehicles with 6-cylinder engine)

Removing

Vehicles with 4-cylinder engine

- Raise vehicle.
- Place drip tray V.A.G 1306 below gearbox.



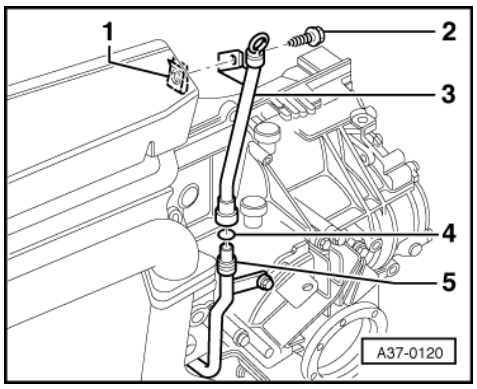
- -> Remove ATF inspection plug -3- and overflow pipe -2- (5 mm hexagon socket).
- Drain ATF.

Vehicles with 6-cylinder engine

- Draw off ATF using oil exractor V.A.G 1358 A and oil suction probe 1358 A/1.

or

- Raise vehicle.
- Place drip tray VW 1306 below gearbox.



- -> Unscrew union nut at lower ATF filler pipe -5- and pull filler pipe out of oil pan.
- Drain ATF.

Note:

A small quantity will remain in the oil pan.

All models

- Unscrew oil pan bolts in diagonal sequence.

Note:

Clean the magnet in the oil pan. Ensure that the magnet is in full contact with the oil pan.

Installing

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Installation is carried out in the reverse order, when doing this note the following:

- Renew gaskets.
- Tighten oil pan bolts in diagonal sequence and in several stages.
- Change ATF or fill up after performing repairs; check ATF level and top up => Page 38 .

Tightening torques

Component	Nm
Overflow pipe to oil pan	2
ATF filler pipe to oil pan (6-cylinder engine)	80
ATF inspection plug to oil pan	15
Oil pan to gearbox housing (tighten in stages and in diagonal sequence)	8

6.3 - Removing and installing ATF screen

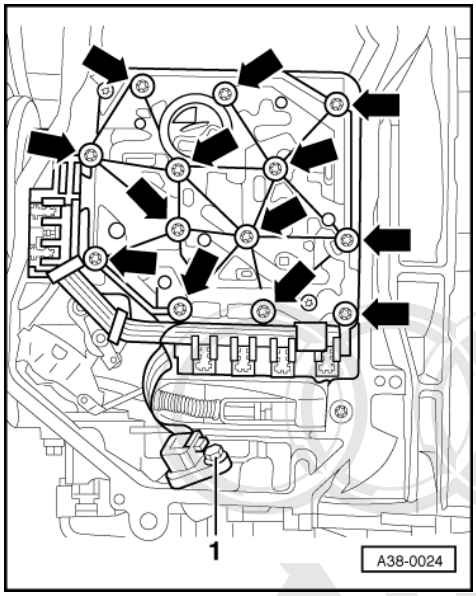
Removing

- Remove oil pan => Page 139 .
- Pull ATF screen off valve body.

Installing

- Press seal onto suction collar on ATF screen
- Insert suction collar of ATF screen about 3 mm into valve body (do not push all the way in).
- When installing oil pan the ATF screen will be pushed into correct installation position.
- Install oil pan=>page 140 .
- Change ATF or fill up after performing repairs; check ATF level and top up => Page 38 .

6.4 - Removing and installing valve body



Removing

- Move selector lever to position "1".
- Remove oil pan => Page 139
- Remove ATF screen => Page 140
- -> Remove securing bolt -1- for 10-pin connector.
- Press 10-pin connector out of gearbox housing from outside to inside.
- Slacken bolts -arrows-.

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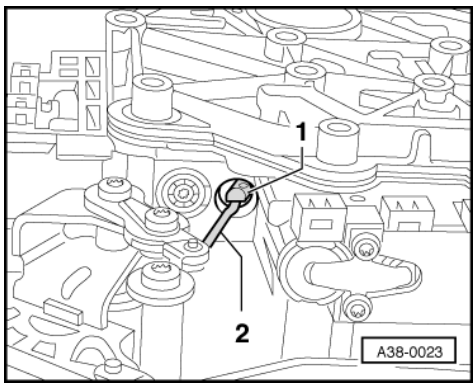
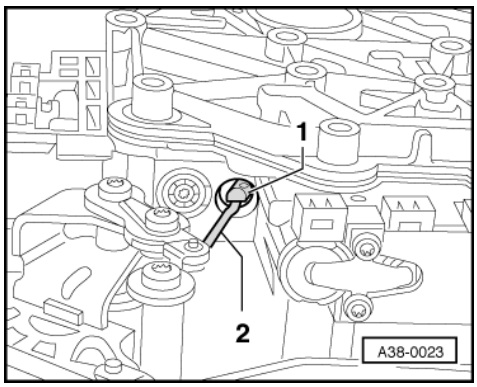
Notes:



- Only slacken the securing bolts indicated in the illustration.
- If other bolts are slackened, this may affect the operation of the valve body or the valve body will come apart.

- -> Take valve body off gearbox; when performing this step, carefully unhook operating rod -2- for manual selector valve from manual selector valve -1-.
- Secure manual selector valve so that it cannot fall out.

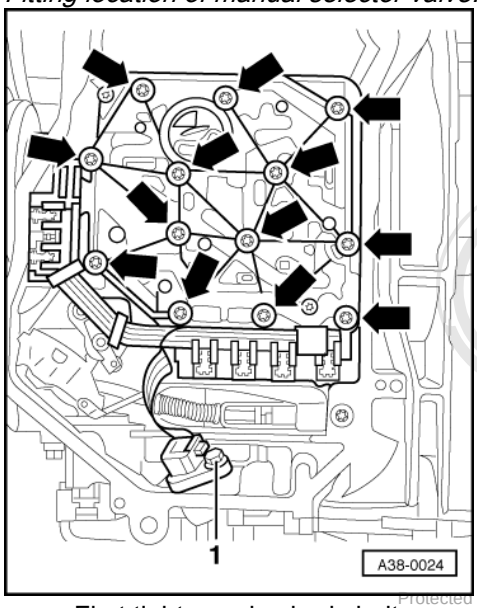


Installing

- -> Fit valve body on gearbox without using any force.
- Engage operating rod -2- in into manual selector valve -1-.
- Guide operating rod -2- with manual selector valve into valve body.

Note:

Fitting location of manual selector valve: the flat on the manual selector valve -1- faces toward the gearbox.



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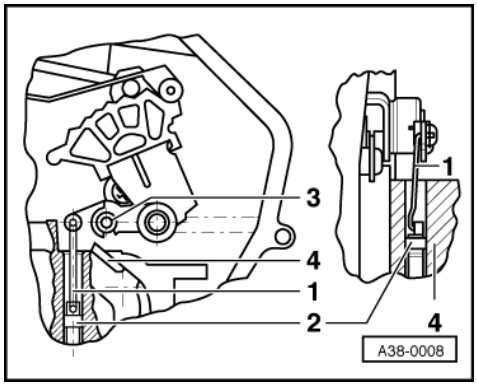
- -> First tighten valve body bolts -arrows- lightly.
- Then tighten alternately crosswise from inside to outside to 5 Nm.
- Route conductor strip so that it is not kinked or twisted when installing.
- Guide 10-pin connector through gearbox housing and tighten securing bolt -1-.

Adjusting operating rod for manual selector valve

- Move selector shaft to position "P".



- -> Push operating rod -1- with manual selector valve -2- into valve body -4- as far as the stop (in direction of arrow) and tighten bolt -3- to 4 Nm.

Notes:

- Always replace bolt and manual selector valve retaining clip.
- The manual selector valve must rest against the stop in the valve body when adjusting. Counter-hold in direction of arrow when tightening bolt.
- Check adjustment: when selector lever is in position "1", manual selector valve must be flush with outside of valve body.

- Install ATF screen=>Page 140 .
- Install oil pan=>Page 140 .
- Change ATF or fill up after performing repairs; check ATF level and top up => Page 38 .

Tightening torque

Component	Nm
Valve body to gearbox housing (tighten from inside to outside)	5

6.5 - Removing and installing conductor strip with 10-pin connector

Special tools, testers and auxiliary items

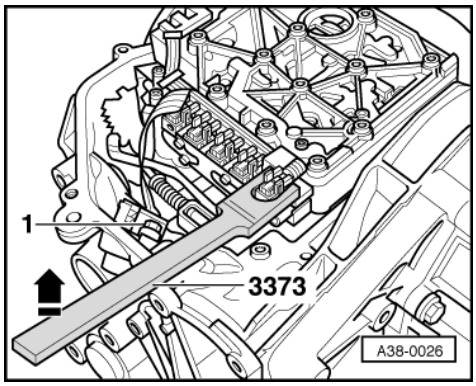
- Lever for conductor strip 3373.

Notes:

- The gearbox oil temperature (ATF) sender -G93 is integrated in the conductor strip.
- Valve body installed or removed.

Removing

- Remove oil pan => Page 139 .
- Remove ATF screen => Page 140 .



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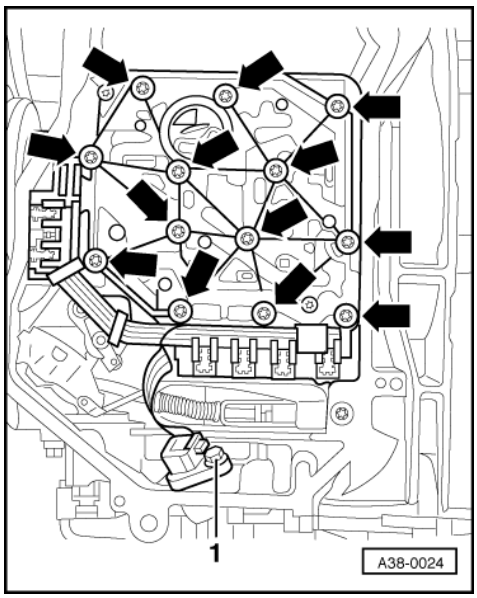
- -> Remove securing bolt -1- for 10-pin connector.
- Press 10-pin connector out of gearbox housing from outside to inside.
- Use 3373 to lever conductor strip off the solenoid valves in direction of arrow.

Note:

If the retaining catches on the solenoid valves are damaged, the valve body must be renewed.

Installing



- -> Route conductor strip so that it is not kinked or twisted when installed.
- Press the individual connectors of the conductor strip onto the solenoid valves so that they engage properly.
- Guide 10-pin connector through gearbox housing and tighten securing bolt -1-.
- Install ATF screen=>Page 140 .
- Install oil pan=>Page 140 .

7 - Dismantling and assembling parking lock

7.1 - Dismantling and assembling parking lock

Caution
Do not run the engine or tow the vehicle if the oil pan is removed or if ATF has been drained from the gearbox.

Notes:

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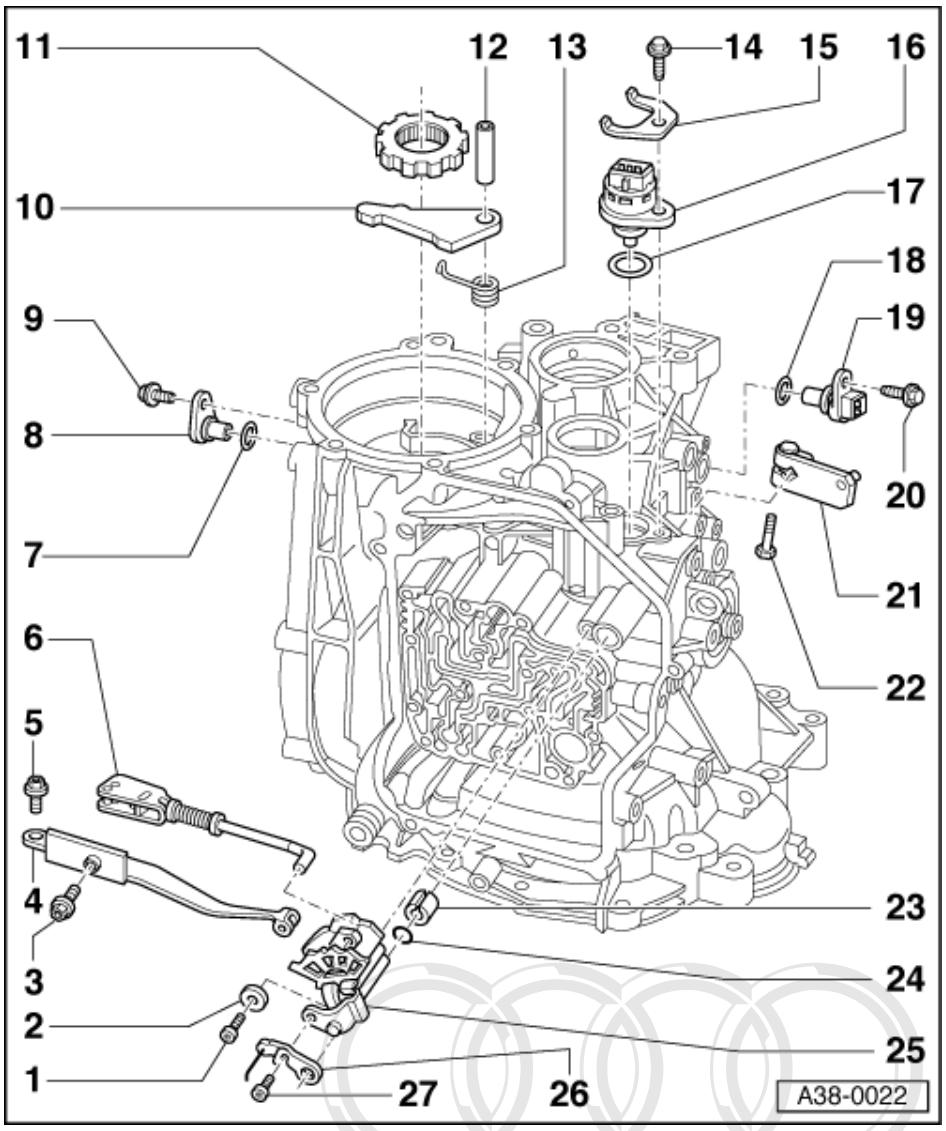
- Rules for cleanliness when working on the automatic gearbox => Page 47 .
- General repair instructions=>Page 4 .
- Lightly lubricate O-rings with ATF. Other types of lubricant can cause problems with the hydraulic actuation of the gearbox.
- Multi-function switch -F125, gearbox speed sender -G38- and road speed sender -G68 can be tested by self-diagnosis.

=> Automatic gearbox 01N, Self-diagnosis; Repair group 01; Performing self-diagnosis; Reading measured value block Performing self-diagnosis Reading measured value block

- The output gear has to be removed in order to dismantle and assemble the parking lock => Removing and installing drive pinion, Page 167 .
- Shim "S4" for the drive pinion must be re-measured (=> Page 201) if the parking lock gear is renewed.
- Removing and installing planetary gearbox/final drive breather => Fig. 153



1 **Bolt, 10 Nm**
- Secures selector shaft
- Installing
  => Fig. 152

2 **Locking washer**
- Inserting
  => Fig. 152

3 **Bolt - 10 Nm**
- Assemble in correct sequence
  => Fig. 153

4 **Detent spring**
- To remove, remove drive pinion cover and output gear => from Page 167
- To remove, loosen bolts -Items 3 and 5 - and lift parking lock detent lever -Item 10 - by hand.

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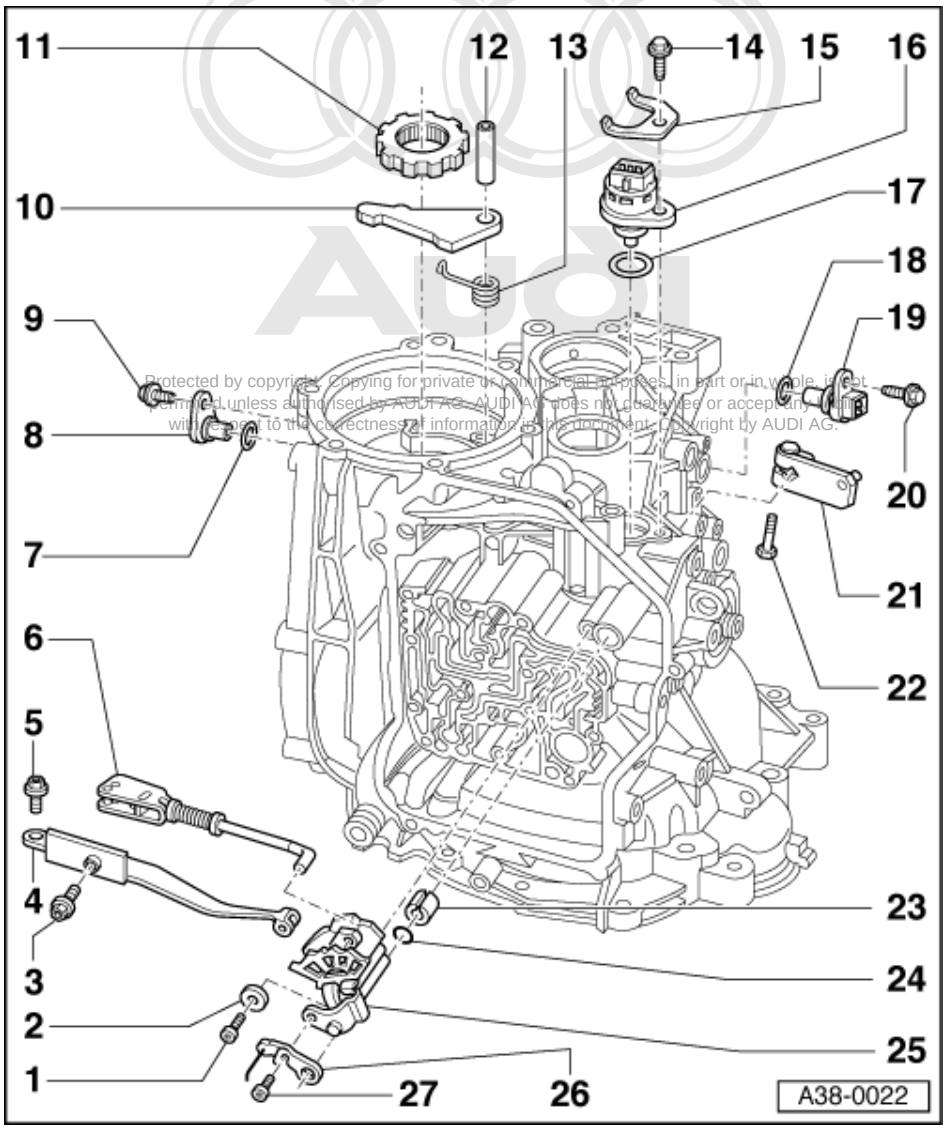

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5 Bolt - 10 Nm

- Assemble in correct sequence
  => Fig. 153

6 Engaging lever

- Insert together with selector shaft and detent segment

7 O-ring

- Renew

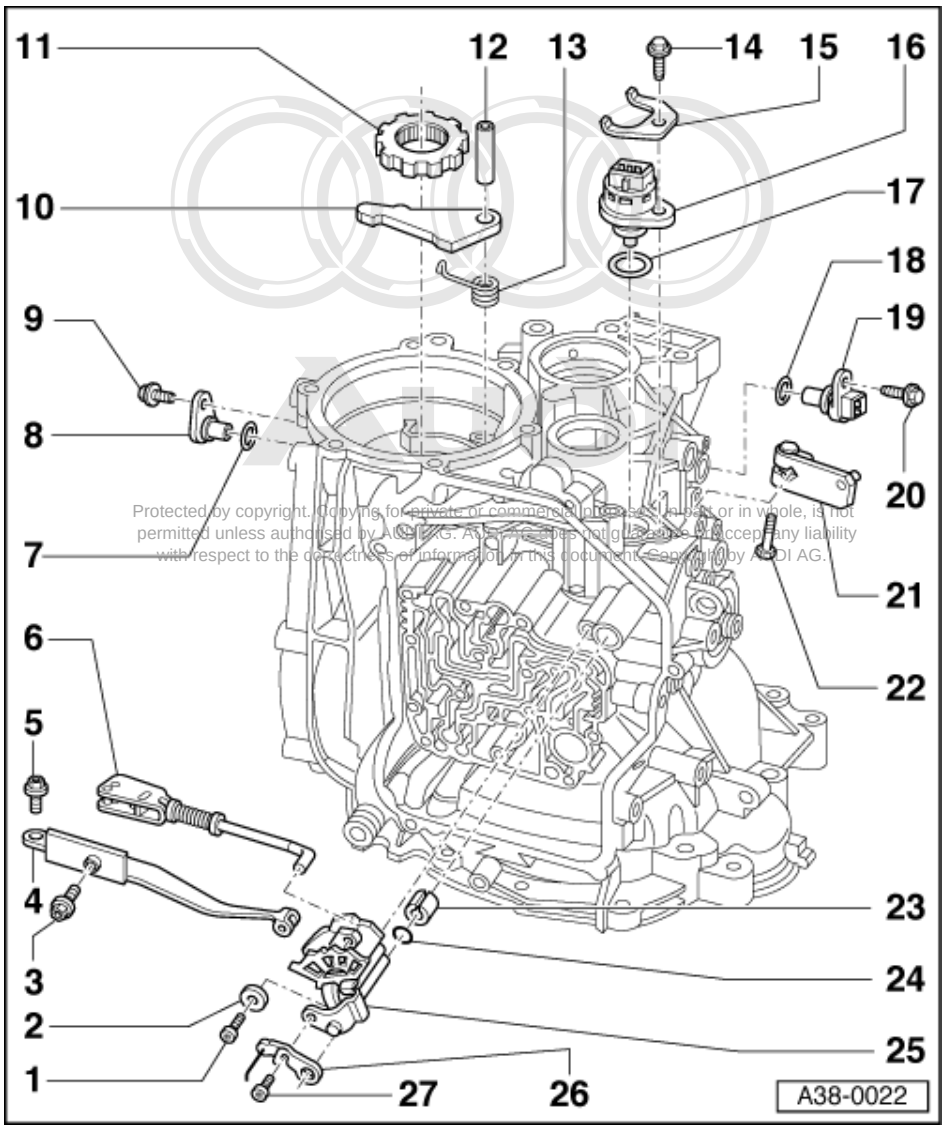
8 Gearbox speed sender -G38

- Tested in the vehicle by self-diagnosis

=> Automatic gearbox 01N; Repair group 01; Performing self-diagnosis; Reading measured value block Performing self-diagnosis Reading measured value block

- Functioning is impaired by dirt; clean if necessary

9 Bolt - 10 Nm



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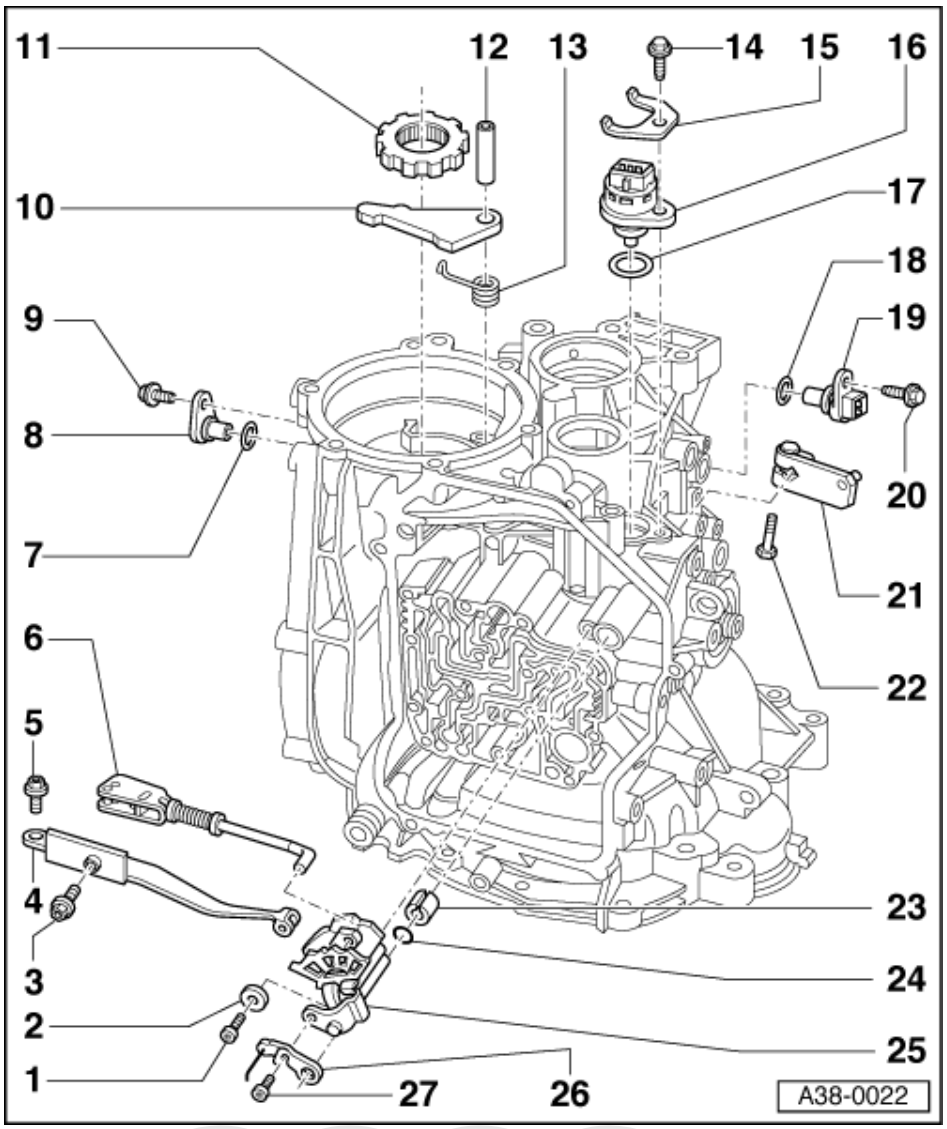
10 Detent lever

- To remove, remove drive pinion cover and output gear => from Page 167
- To remove, pull out detent lever shaft -item 12 -
- Insert with return spring
- Installation position: must be aligned centrally with parking lock gear.

11 Parking lock gear

- To remove, remove drive pinion cover and output gear => from Page 167
- Installation position:
  Rounded side of parking lock gear faces drive pinion cover
- If parking lock gear is renewed, thickness of shim "S4" for drive pinion must be re-determined => Page 201



12 Shaft for detent lever

- Pulling out
  => Fig. 151
- Drive in with a drift
- Peening
  => Fig. 152

13 Return spring

- Supported on gearbox housing and hooked into detent lever

14 Bolt - 10 Nm

15 Retainer

16 Multi-function switch -F125

- Remove before removing selector shaft -item 25 -
- Tested in the vehicle by self-diagnosis

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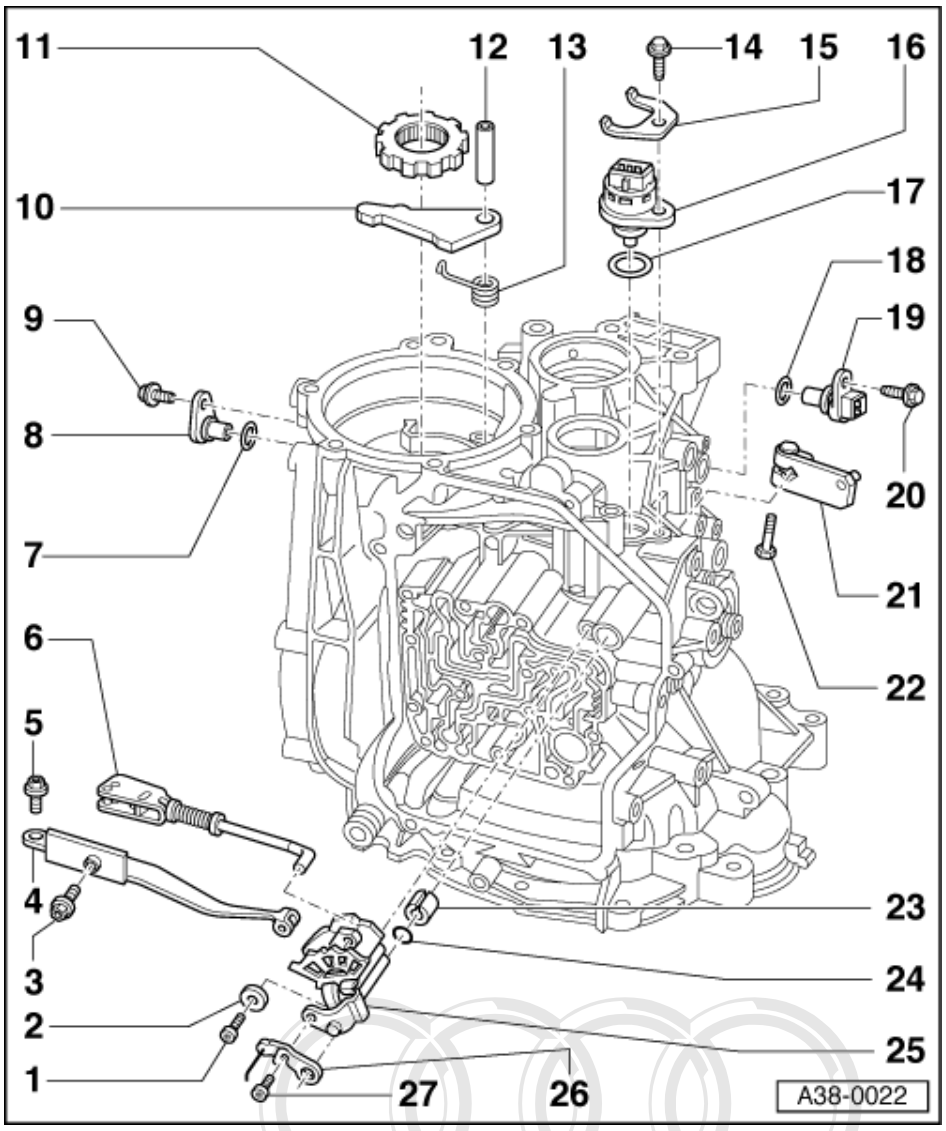
=> Automatic gearbox 01N; Repair group 01; Performing self-diagnosis; Reading measured value block Performing self-diagnosis Reading measured value block



17 O-ring

- Renew

18 O-ring

- Renew

19 Road speed sender -G68

- Tested in the vehicle by self-diagnosis

=> Automatic gearbox 01N; Repair group 01; Performing self-diagnosis; Reading measured value block Performing self-diagnosis Reading measured value block

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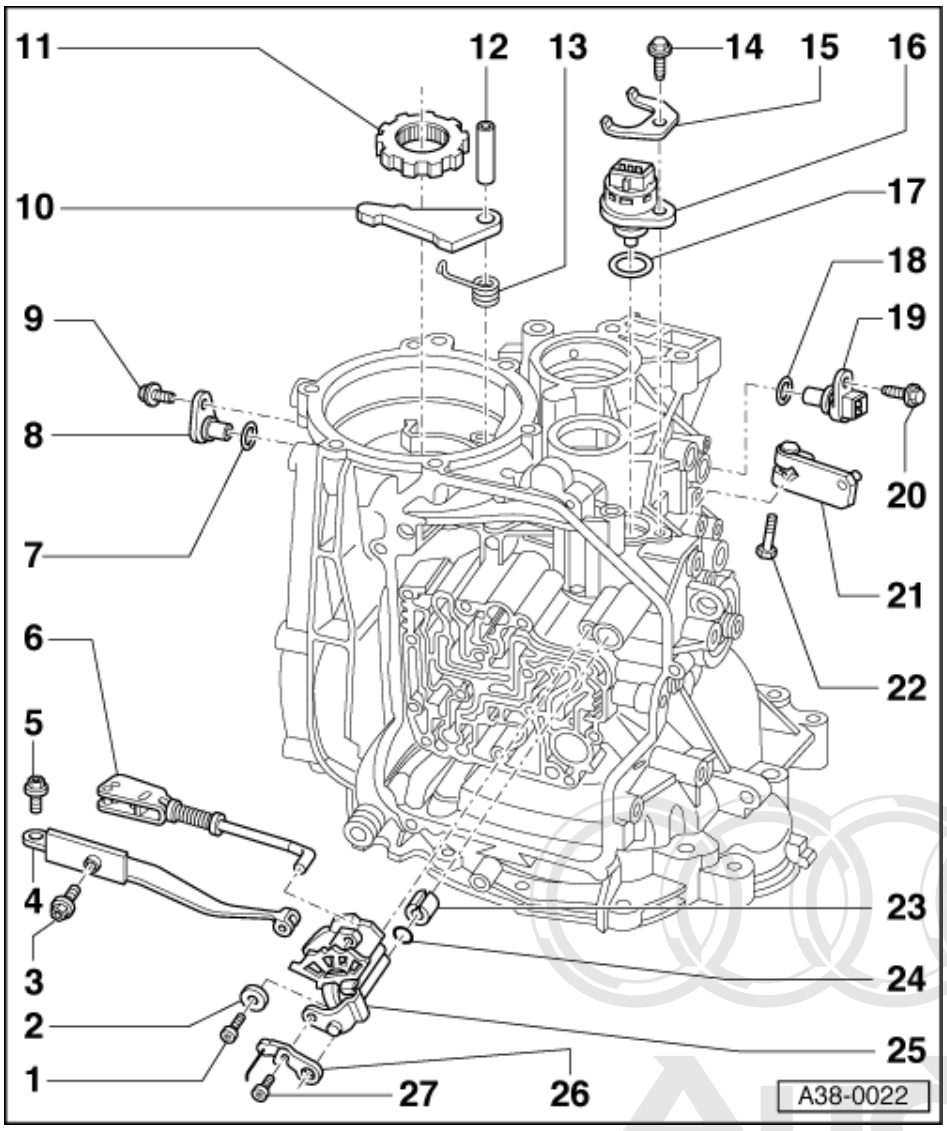
- Functioning is impaired by dirt; clean if necessary

20 Bolt - 10 Nm

21 Lever

- For selector shaft

22 Bolt - 10 Nm



23 Mounting bush

- Drive in and drive out with drift
- Insert before installing selector shaft

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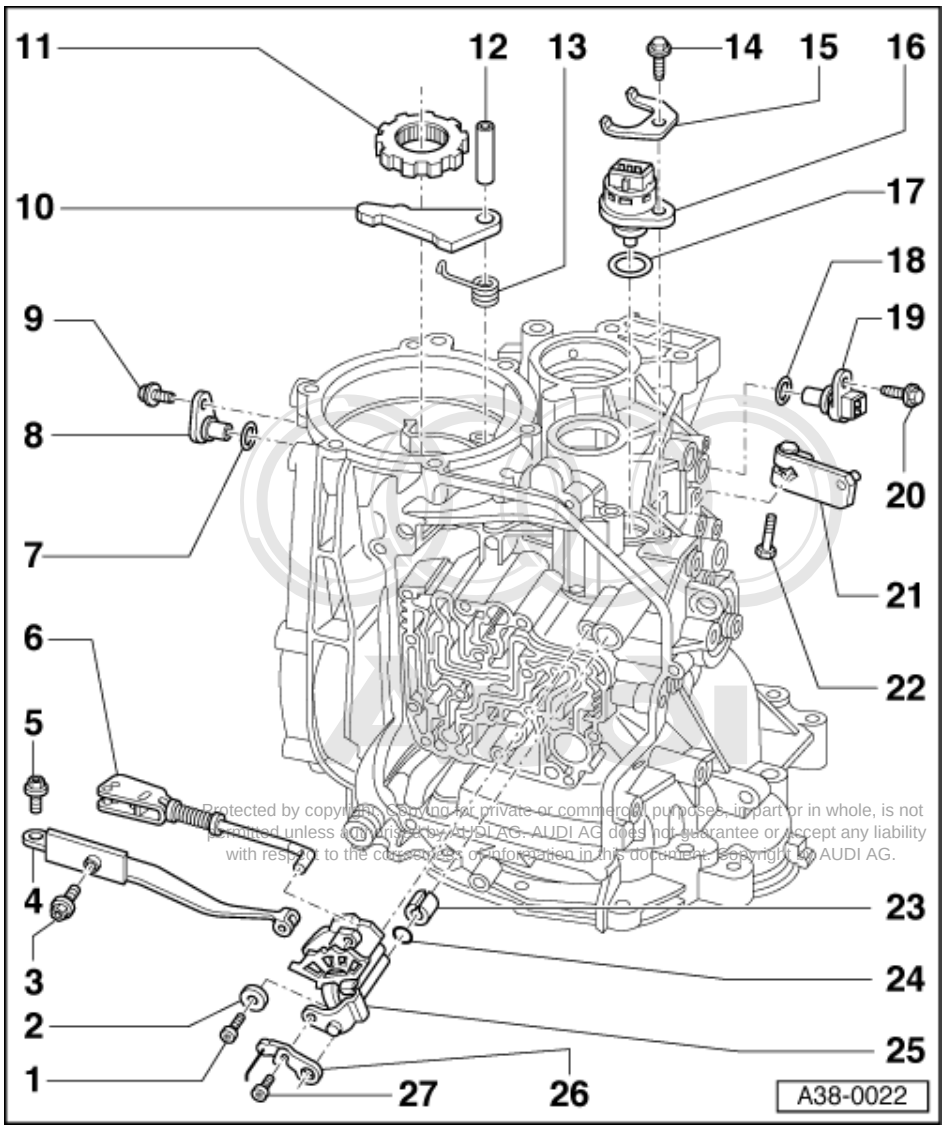
24 O-ring

- Renew
- Seat in selector shaft groove
- Installation position
  => Fig. 152

25 Selector shaft

- Remove multi-function switch -F125 -Item 16 - and detent spring -Item 4 - before removing selector shaft
- When installing, insert together with engaging lever -item 6 -
- Secure with locking washer -Item 152
- Note positions of components
  => Fig. 152



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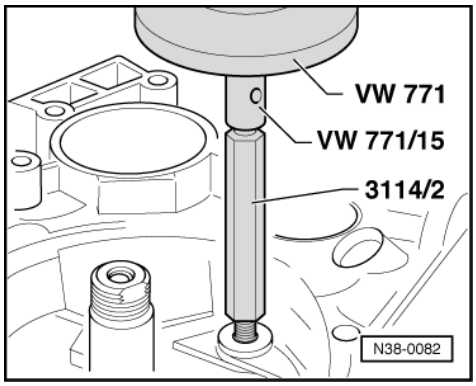
26 Operating rod for manual selector valve

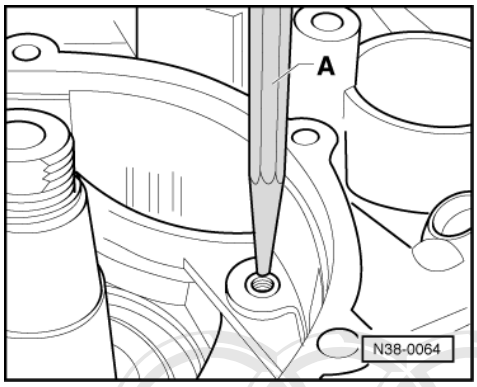
- Adjusting => Page 142

27 Bolt - 5 Nm



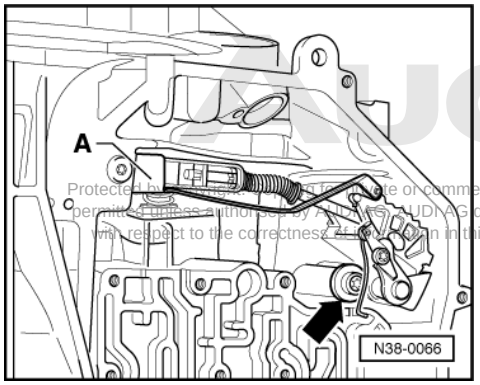
-> Fig.1 Pulling out shaft for detent lever

- Pull out shaft with multi-purpose tool VW 771.



-> Fig.2 Peening shaft for detent lever

- Drive in shaft with threaded hole upwards.
- Secure shaft by peening gearbox housing to shaft using a centre punch -A-.



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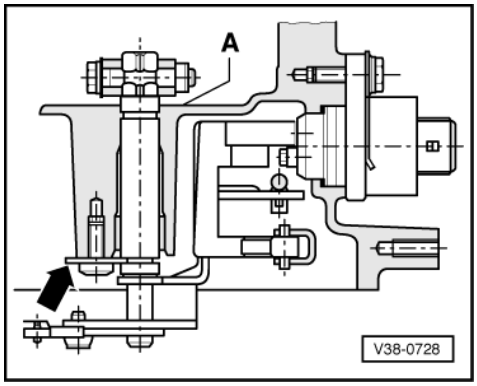
-> Fig.3 Removing and installing selector shaft

- Remove bolt (arrow) and take out locking washer.

Note:

The selector shaft can be removed or installed after removing the detent spring -A-.

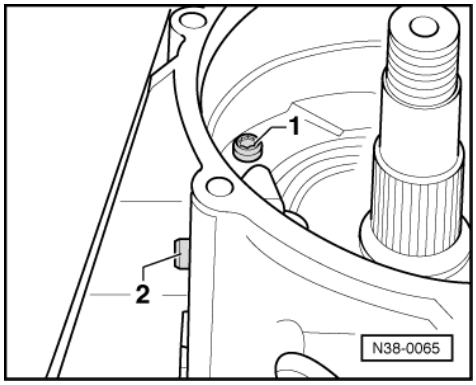


-> Arrow points to locking washer.

A - O-ring

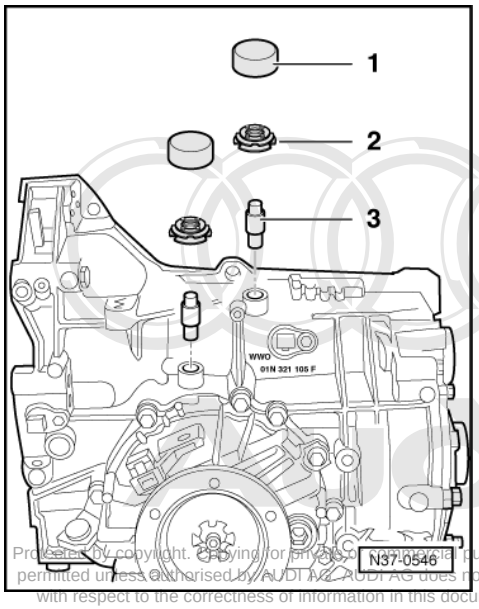
Note:

The illustration shows the selector shaft in cross-section.



-> Fig.4 Inserting bolts for detent spring

- Screw in bolts -1- and -2- approx. 3 turns.
- Tighten bolt -2- to 10 Nm and then tighten bolt -1- to 10 Nm.



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-> Fig.5 Removing and installing planetary gearbox/final drive breather

1 - Breather cap
2 - Breather
3 - Breather pipe
-Remove using pliers
-Drive onto stop with copper drift

39 - Final drive, Differential

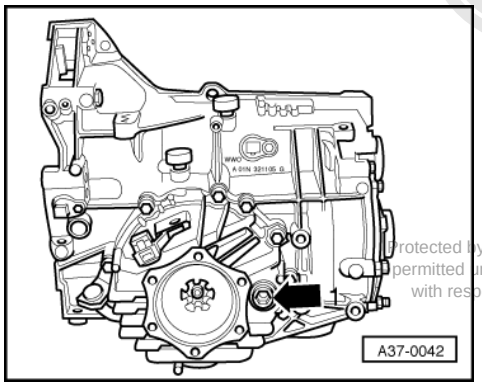
1 - Checking oil in final drive

1.1 - Checking oil in final drive

Test conditions:

- Gearbox should be cold or just hand-warm.
- Vehicle must be standing on level surface.

Checking:



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- -> Unscrew oil filler plug -arrow-.
  - Specification: oil level should be up to the bottom of the hole.
- Top up gear oil if necessary. Specifications => Page 3 .
- Screw in plug. Tightening torque: 25 Nm.

2 - Renewing flange shaft oil seals

2.1 - Renewing flange shaft oil seals

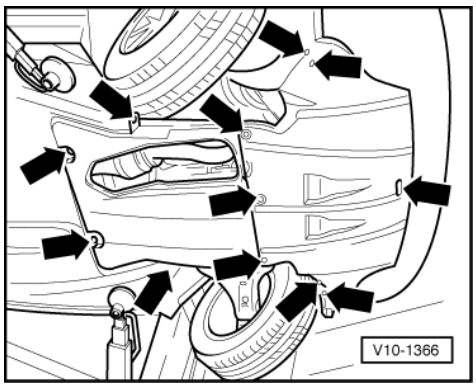
2.2 - Renewing left-hand flange shaft oil seal

Special tools, testers and auxiliary items

- Extractor lever VW 681
- Press piece 3377
- Drip tray V.A.G 1306

Removing

- Gearbox installed.



- Only loosen drive shaft/wheel hub nut and wheel bolts when vehicle is standing on its own wheels.
- Remove front left wheel.
- -> Diesel engine: remove noise insulation below and on sides of gearbox.
- 6-cylinder engine: unbolt heat shield for drive shaft.

- Remove drive shaft

=> Running gear, Front-wheel drive; Repair group 40; Removing and installing suspension strut and drive shaft Removing and installing suspension strut and drive shaft

- Place drip tray V.A.G 1306 below gearbox.
- Unscrew central bolt for left flange shaft (use pin to prevent flange shaft from turning).
- Pull out flange shaft.
- Pull out flange shaft oil seal with extractor lever VW 681.

Installing

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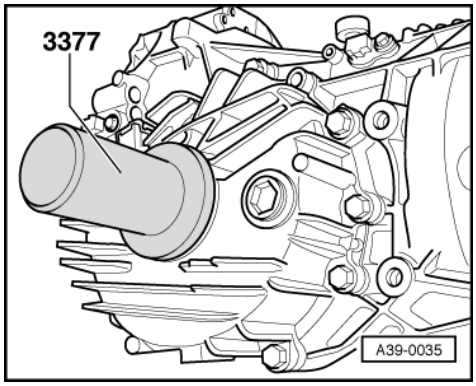
Installation is carried out in the reverse order, when doing this note the following:

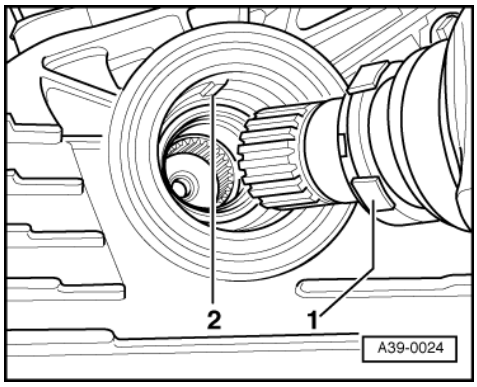
- Moisten outer circumference of seal with gear oil.
- Fill space between sealing lip and dust lip with multi-purpose grease.

Note:

Ensure that seal is inserted in housing at same depth all round.



- -> Drive new seal in onto stop, when doing this do not cant seal.
  - Installation position: open side of seal towards gearbox
- Install flange shaft with spring, thrust washer, tapered ring and circlip.



- -> Both lugs -2- on drive gear for speedometer sender must engage between tabs -1- on thrust washer.

Note:

Conical thrust surface on tapered ring faces towards differential.

- Insert left flange shaft into gearbox.
- With gearbox installed, check final drive oil level
  => Page 154 .

Tightening torques

Component		Nm
Central bolt for left flange shaft		30
Drive shaft to gearbox	M8	40
	M10	80
Drive shaft to wheel hub	M14	120 + 90° 1)2)
	M16	200 + 90° 1)2)
Heat shield for drive shaft to gearbox		25

1) stretch bolts - renew
2) 90° is a quarter turn

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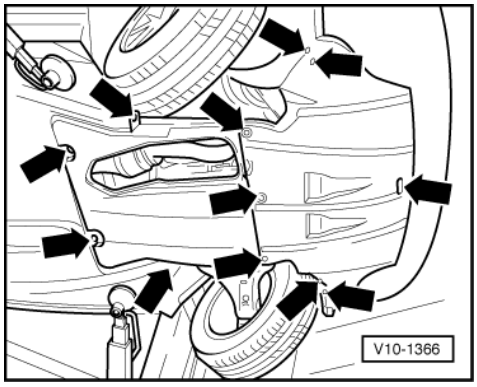
2.3 - Renewing right-hand drive flange oil seal

Special tools, testers and auxiliary items

- Extractor lever VW 681
- Press piece 3236
- Fitting appliance 3244
- Press piece 3323
- Two-arm puller Kukko 18/1



Removing

- Gearbox installed.

- Only loosen drive shaft/wheel hub nut and wheel bolts when vehicle is standing on its own wheels.
- Remove front right wheel.
- -> Diesel engine: remove noise insulation below and on sides of gearbox.

- Remove heat shield for right drive shaft.
- 6-cylinder engine: remove right gearbox support
  =>from Page 36 .
- Remove drive shaft

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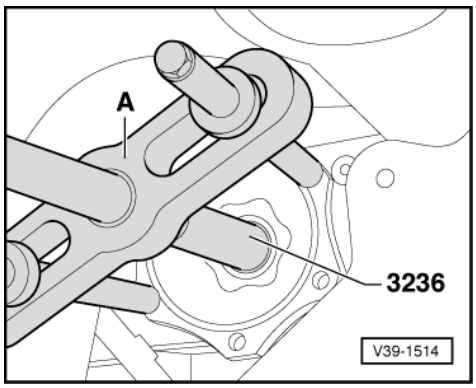
=> Running gear, Front-wheel drive, Repair group 40; Removing and installing suspension strut and drive shaft
Removing and installing suspension strut and drive shaft

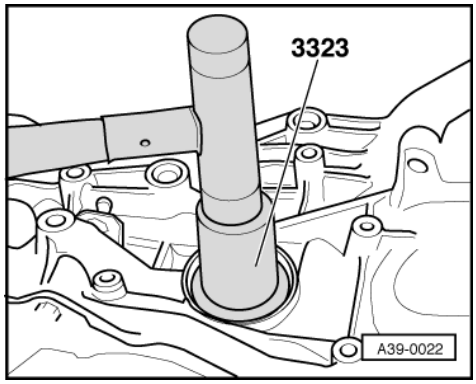
- Pierce sealing cap in drive flange with a screwdriver and lever out.
- Lever off circlip.
- Place drip tray V.A.G 1306 below gearbox.



- -> Remove drive flange with press piece 3236 and two-arm puller Kukko 18/1 -A-.
- Pull out drive flange oil seal with extractor lever VW 681.

Installing

Installation is carried out in the reverse order, when doing this note the following:



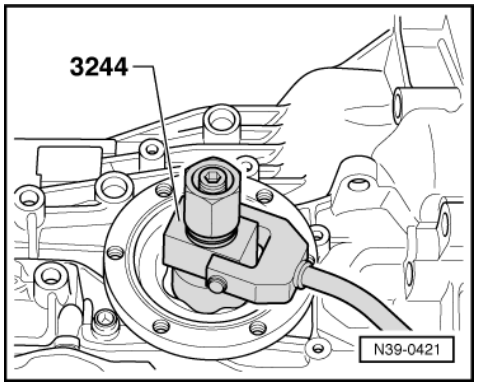
- Moisten outer circumference of seal with gear oil.
- Fill space between sealing lip and dust lip with multi-purpose grease.

Note:

Ensure that seal is inserted in housing at same depth all round.

- -> Drive new seal in onto stop, when doing this do not cant seal.

- Installation position: open side of seal towards gearbox



- -> Pull in drive flange.
- Fit new circlip.
- Drive new sealing cap into drive flange using 30 mm wrench socket.
- With gearbox installed, check final drive oil level
  => Page 154 .

Tightening torques

Component		Nm
Drive shaft to gearbox	M8	40
	M10	80
Drive shaft to wheel hub	M14	120 + 90° 1)2)
	M16	200 + 90° 1)2)
Right gearbox support to gearbox		40
Right gearbox support to bonded rubber bush		40
Bonded rubber bush to subframe		25
Heat shield for drive shaft to gearbox		25

1) stretch bolts - renew

2) 90° is a quarter turn

2.4 - Removing and installing grooved ball bearing

Special tools, testers and auxiliary items

- Puller sleeve 3378
- Puller V.A.G 1582
- Grip piece V.A.G 1582/10

Removing

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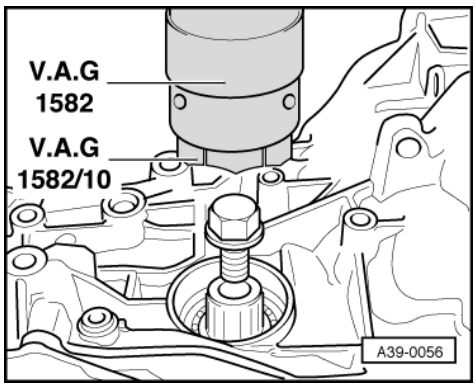
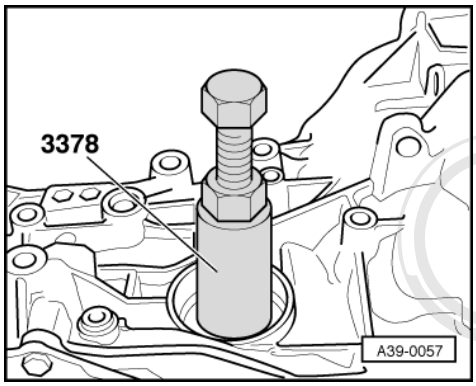
- Differential is installed.

- Remove right-hand drive flange oil seal=>from Page 156 .



- Lever out circlip for grooved ball bearing.
- -> Insert M12 x 20 hexagon bolt with washer in drive flange output shaft hole.
- Tension claws of grip piece V.A.G 1582/10 between balls on grooved ball bearing inner race.
- Pull out grooved ball bearing with puller V.A.G 1582.

Installing



- -> Pull in grooved ball bearing together with tapered ring and spring.
- Insert circlip for grooved ball bearing.
- Drive in right-hand drive flange oil seal=>from Page 157 .

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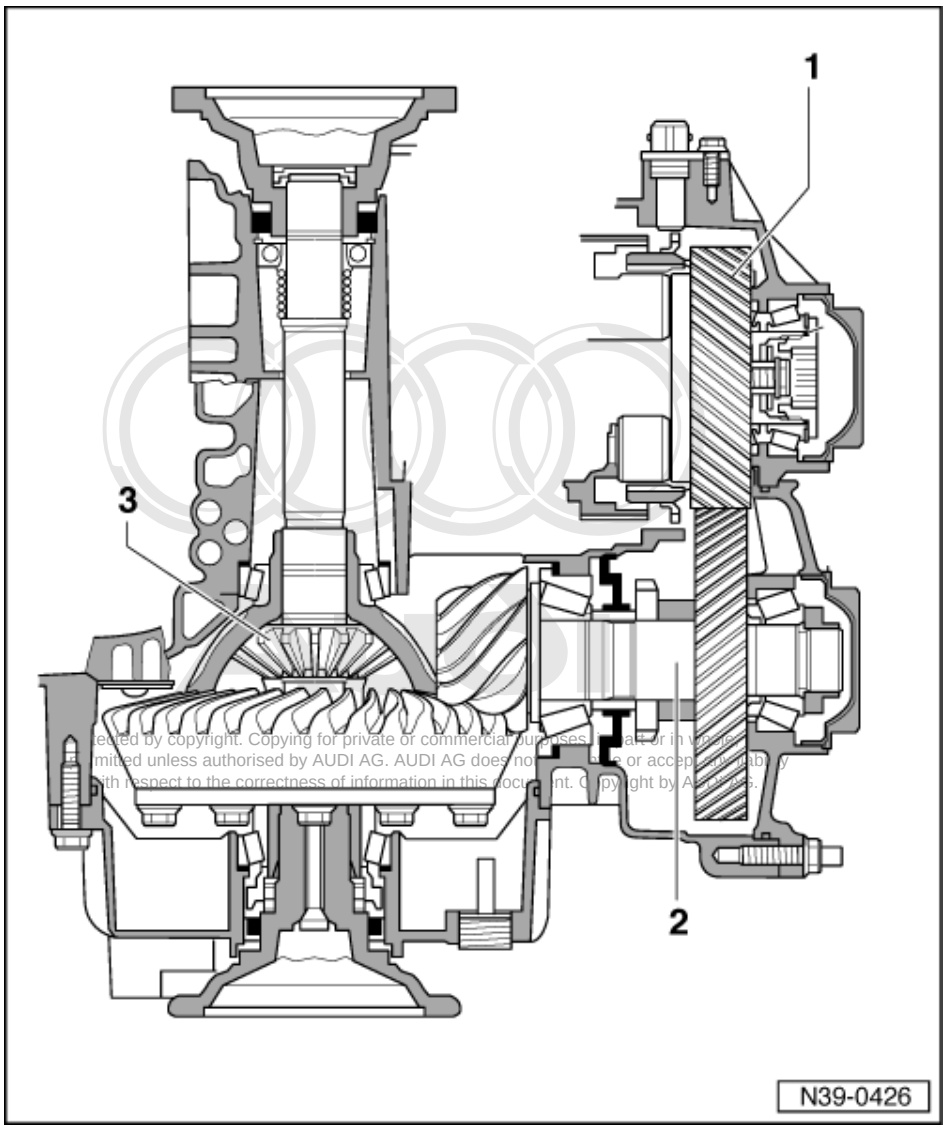
3 - Dismantling and assembling final drive

3.1 - Dismantling and assembling final drive



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3.2 - Repair overview of final drive

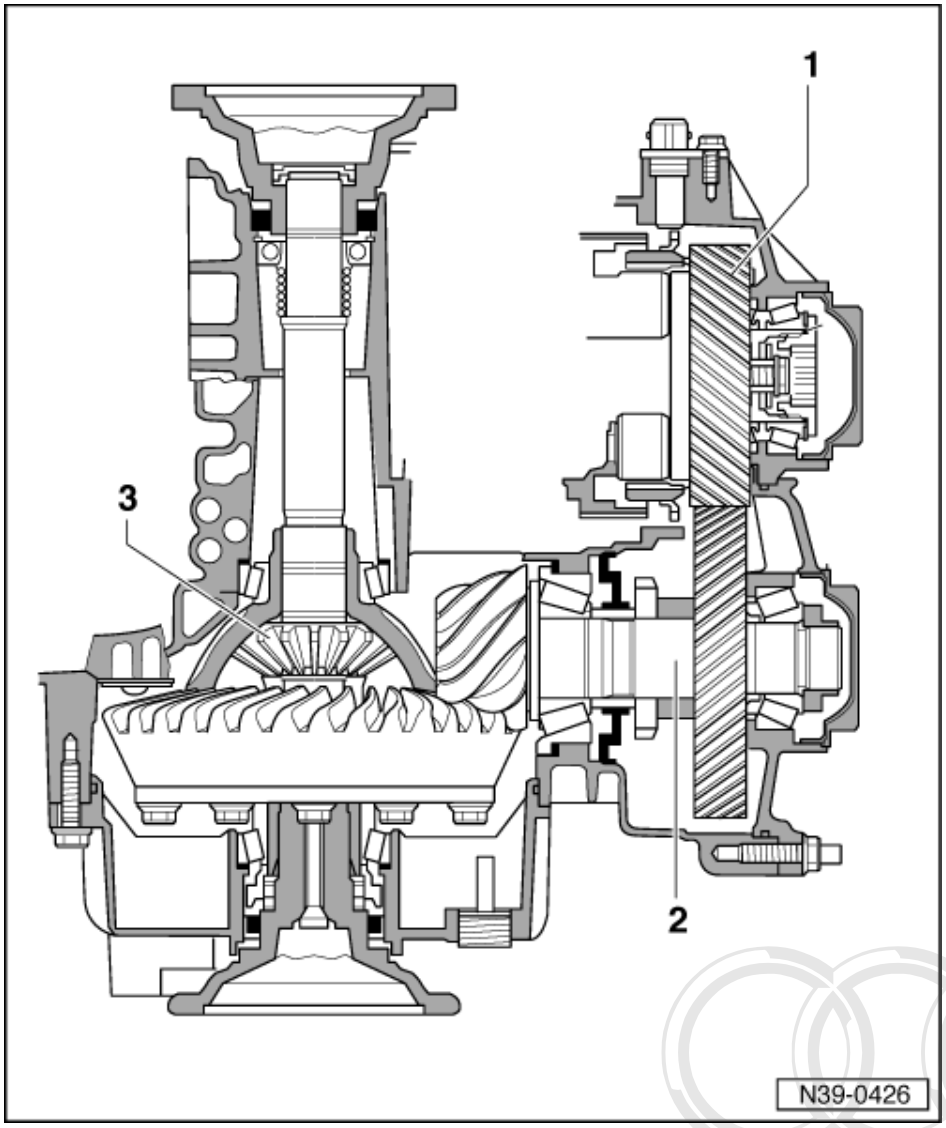
1 Input gear

- Removing and installing
  => Page 161
- Adjusting => Page 195
- Adjusting final drive (overview) =>Page 191
- Repairs on the input gear can only be performed after the individual components of the planetary gearbox have been removed.

2 Drive pinion

- Removing and installing
  => Page 167
- Adjusting crown wheel and drive pinion => Page 198
- Adjusting final drive (overview)

=> Page 191



3 **Differential**

- Removing and installing
  => Page 176
- Dismantling and assembling
  =>Page 183
- Adjusting crown wheel and drive pinion => Page 198
- Adjusting final drive (overview)
  => Page 191

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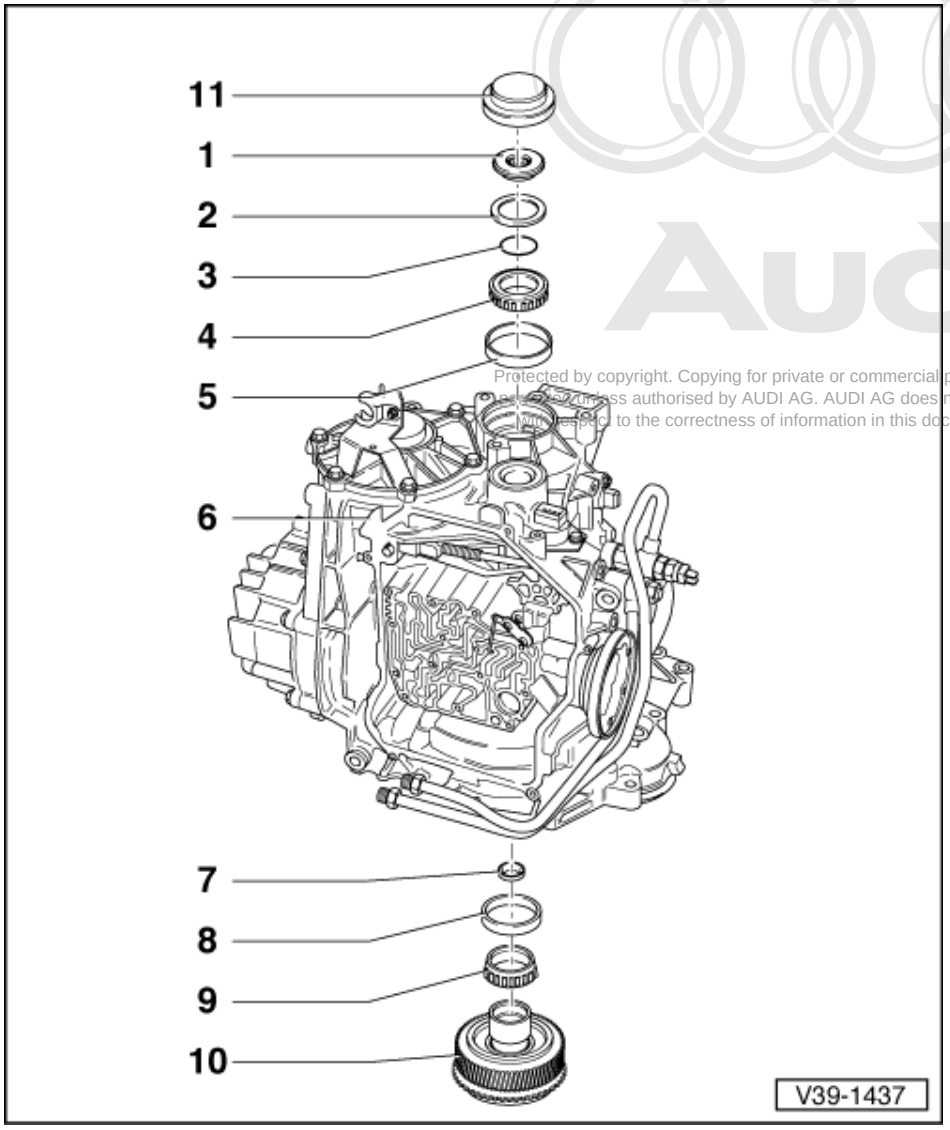
3.3 - Removing and installing input gear

Notes:

- The input gear can only be removed once the planetary gearbox has been removed => Page 54 .
- Measure friction torque at drive pinion nut before and after removing input gear=>Page 197 . Note friction torque value.
- If taper roller bearings are not renewed, set to previously measured friction torque again.
- The drive pinion and differential do not need to be removed in order to remove input gear.
- Always replace input gear and output gear together.
- After replacing the taper roller bearings, the input gear, planet carrier and clutch play between K1 and K2 must be adjusted.

=> Pages 98 .

- After replacing input gear (together with output gear), the input gear, "S4" shim, drive pinion, planet carrier and clutch play between K1 and K2 must be adjusted => Pages 98 .
- Always replace all taper roller bearings on the same shaft together, using bearings made by same manufacturer.
- Do not interchange outer or inner races of bearings which are the same size.



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1 Socket head fastener - 250 Nm

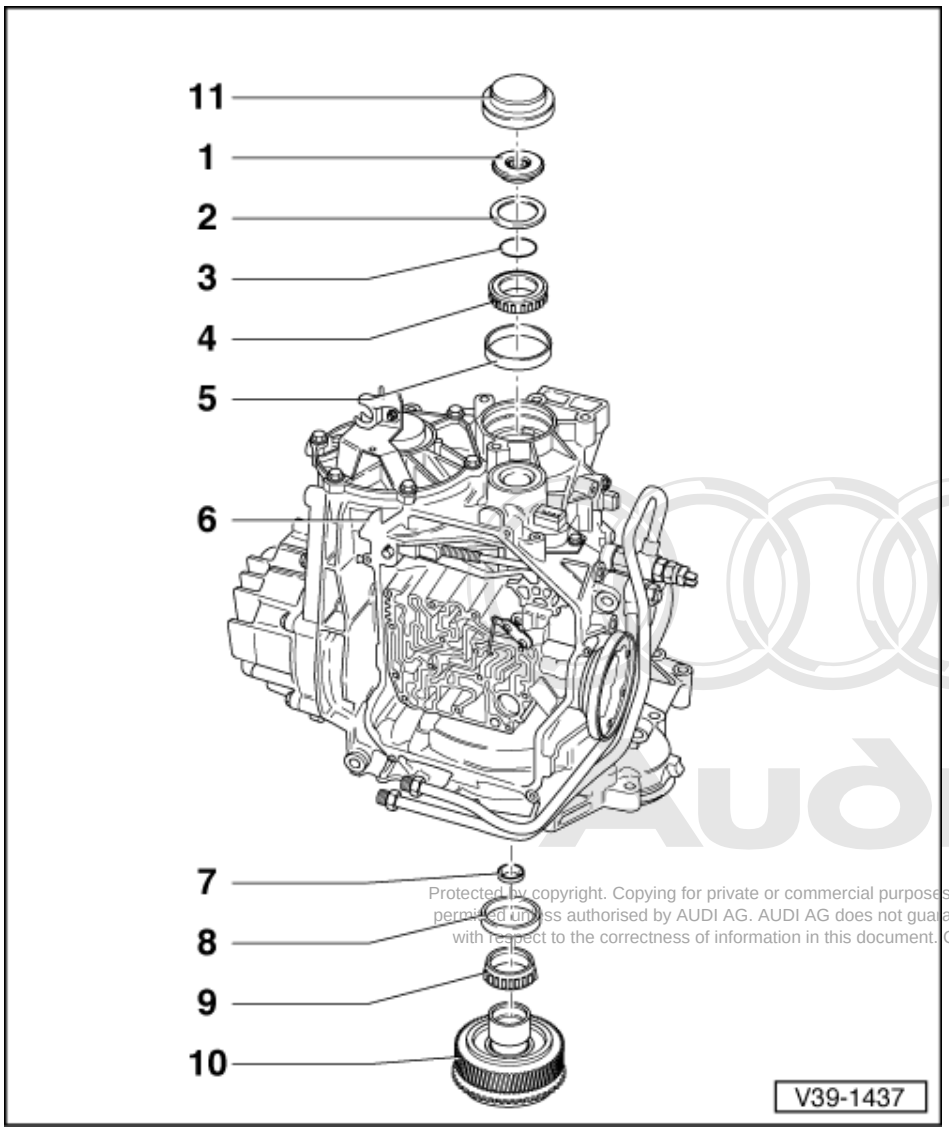
- Engage parking lock to remove and install
- Removing and installing
  =>Fig. 166
- Before installing socket head fastener insert axial needle bearing (item 7)

2 Dished washer

- Install with convex side facing toward socket head fastener

3 Shim

- Determining thickness => Adjusting input gear, Page 195



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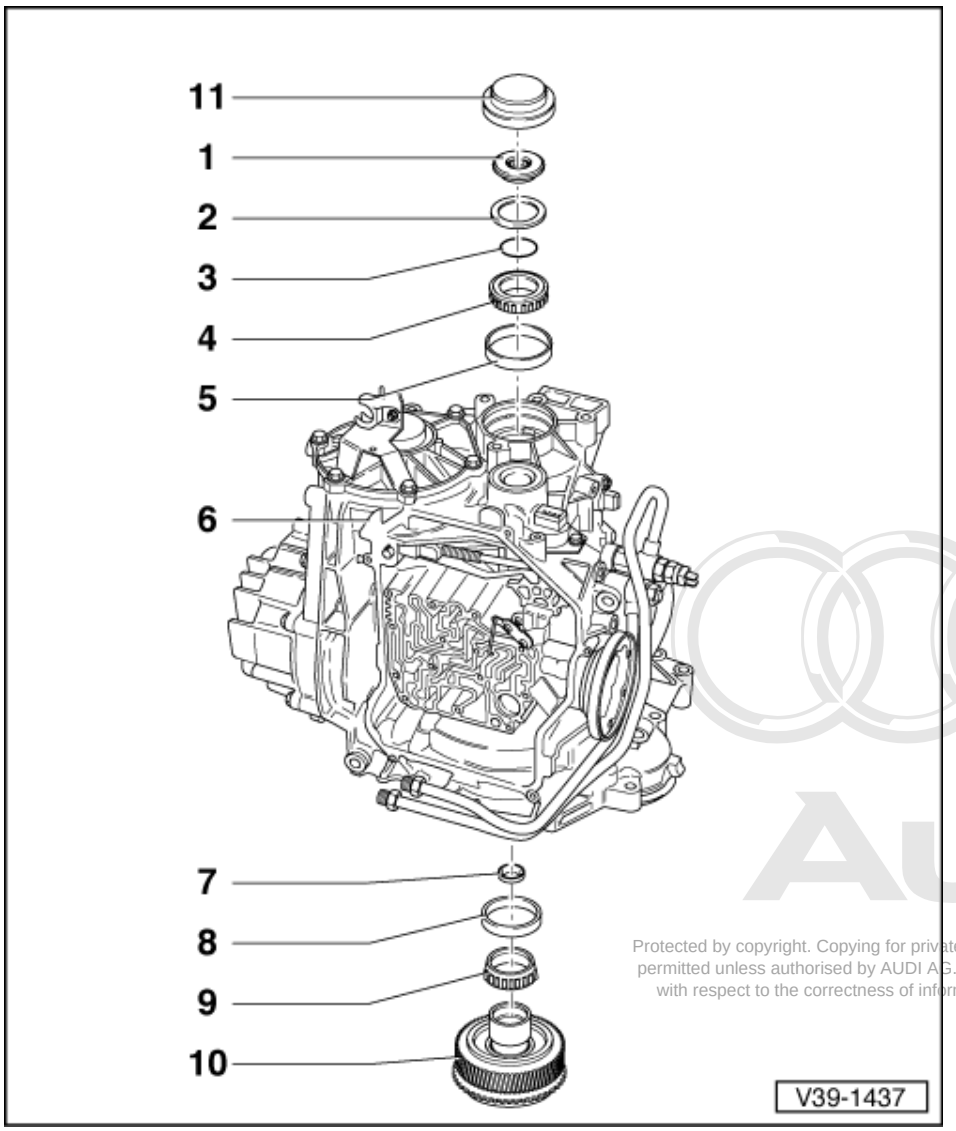
4 Taper roller bearing inner race

- With roller cage
- Remove together with input gear -Item 10 -
- Apply locking fluid AMV 185 101 A1 and fit onto input gear
- To install, drive several millimetres onto input gear -Item 10 -, then pull down with socket head fastener -Item 1 -

5 Taper roller bearing outer race

- Drive out with drift
- Drive in with 30-205
- Insert with locking fluid AMV 185 101 A1



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6 Gearbox housing

7 Axial needle bearing

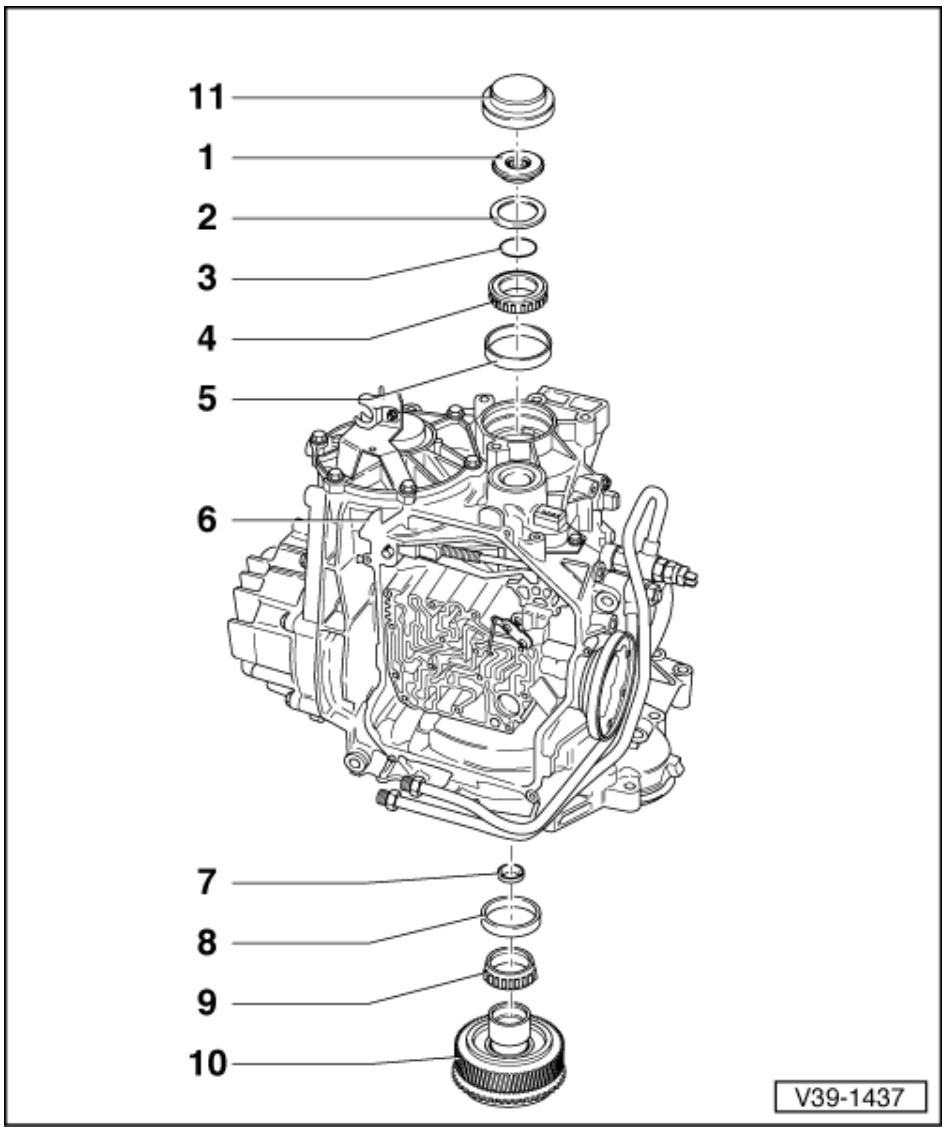
- Insert into input gear before installing socket head fastener (item 1)
- Install with flat side facing toward input gear

8 Taper roller bearing outer race

- Drive out with drift
- Drive in with 30-205 and drift of correct length
- Insert with locking fluid
  AMV 185 101 A1

9 Taper roller bearing inner race

- With roller cage
- Pulling off
  =>Fig. 166
- Pressing on
  =>Fig. 167
- Insert with locking fluid
  AMV 185 101 A1



10 Input gear

- To remove, loosen socket head fastener and take off axial needle bearing. Drive out towards inside of gearbox using a 30 mm dia. brass drift
- Number of teeth => from page 2
- Adjusting =>Page 195
- If signs of damage exist, always replace input gear and output gear together

11 Sealing cap

- Driving out
  =>Fig. 166
- Driving in
  =>Fig. 167

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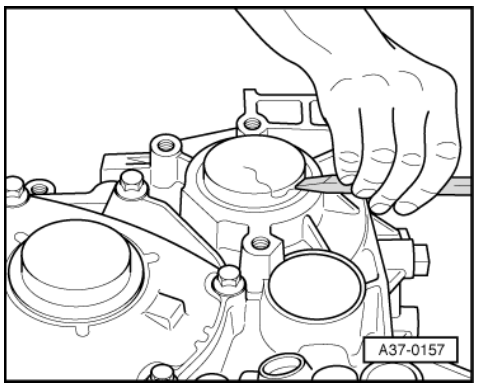
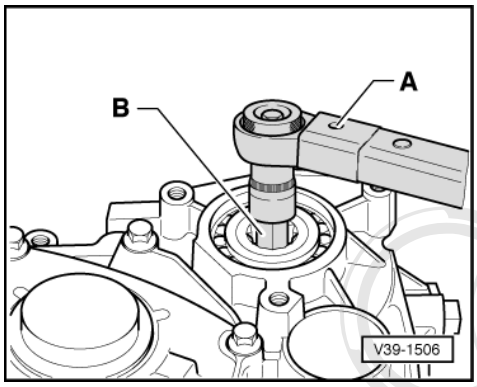


-> Fig.1 Driving out sealing cap



-> Fig.2 Removing and installing socket head fastener

A - Torque wrench
B - Socket attachment, 22 mm A/F

- Engage parking lock to loosen and tighten.

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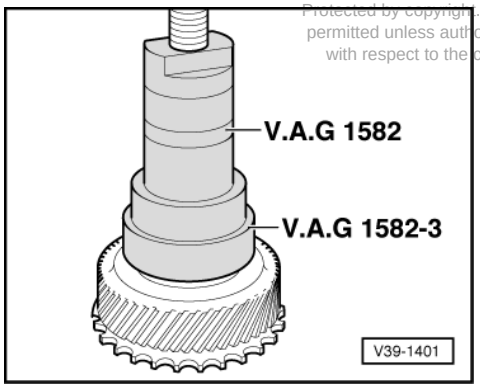
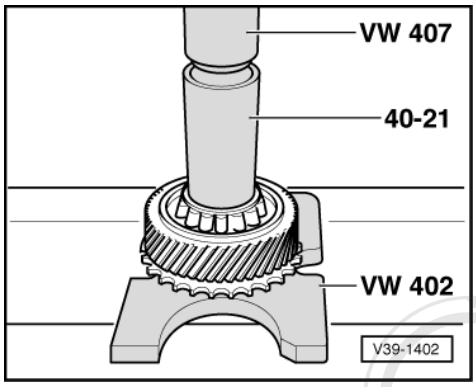


-> Fig.3 Pulling off taper roller bearing inner race

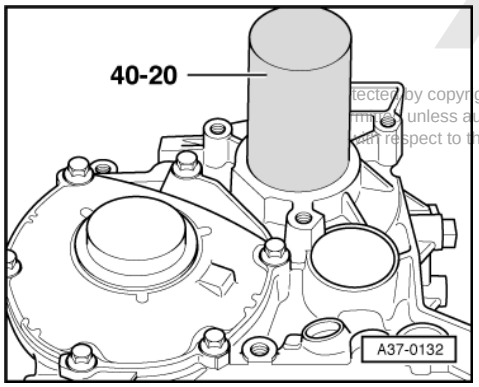
- Place press piece on input gear.



-> Fig.4 Pressing on taper roller bearing inner race

Note:

A press piece must be placed below the hub of the input gear to avoid damaging the input gear.



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-> Fig.5 Driving in sealing cap

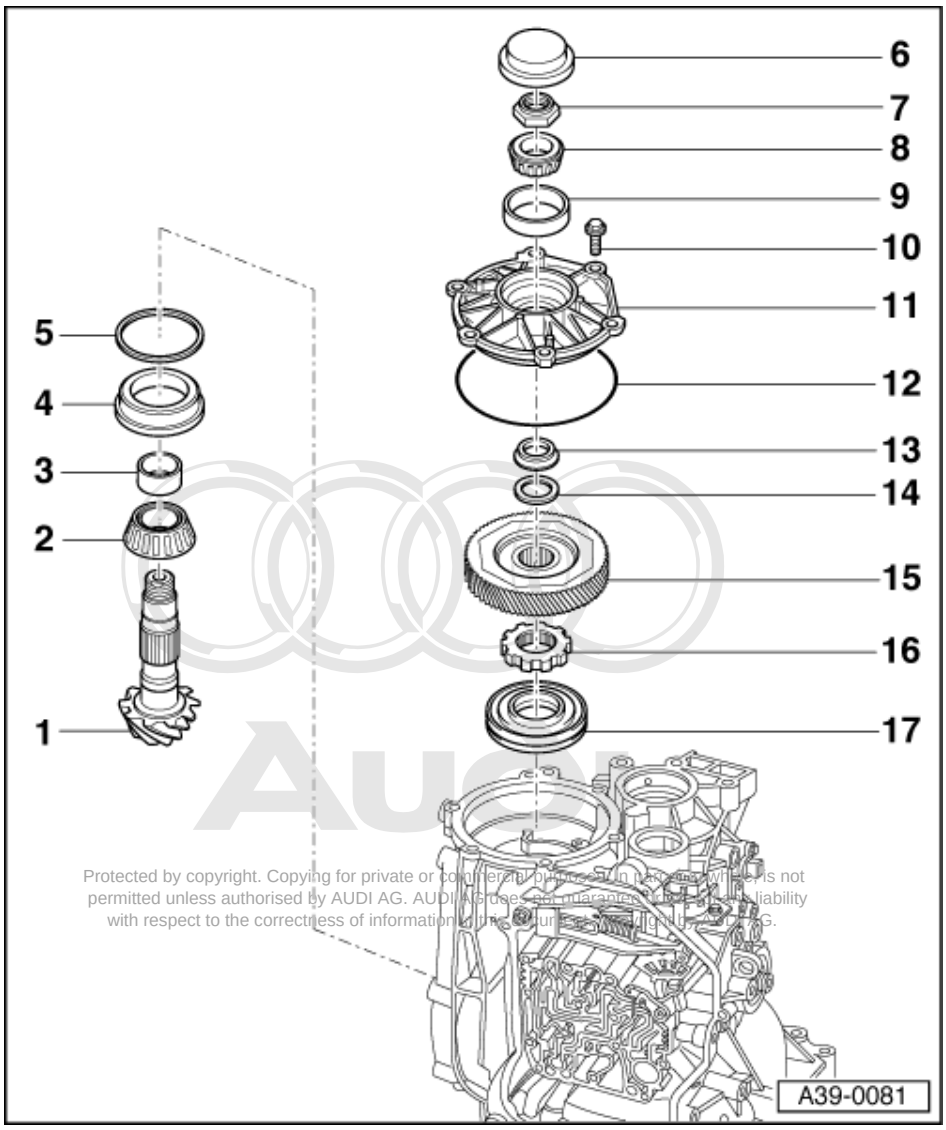
3.4 - Removing and installing drive pinion

Notes:

- Drive pinion and crown wheel may only be replaced together.
- If the same final drive set and taper roller bearings are to be re-installed after a repair, measure the friction torque value (with planetary gearbox removed) before starting the repair=>Page 205 . Note the reading obtained in order to check the friction torque after the repair is completed.
- If the drive pinion cover, spacer tube, input gear or parking lock gear are renewed, re-determine thickness of shim "S4" for the drive pinion => Page 201 .
- If the taper roller bearings or the bush for the drive pinion are renewed, re-determine thickness of shims "S3" and "S4" for the drive pinion => Page 201 .
- If the drive pinion (with crown wheel) is renewed, re-determine thickness of shims "S3" and "S4" and shims "S1" and "S2" (for final drive) => Pages 209 .

- Always replace all taper roller bearings on same shaft together.
- The O-ring -Item 171 can be replaced with the gearbox installed. For other repair work the gearbox has to be removed.
- Oil seal for drive pinion, -Item 172 , must be installed dry. Do not oil or grease sealing lips.
- Adjustments are required when replacing components marked1)

=>Adjustment overview Page 194 .



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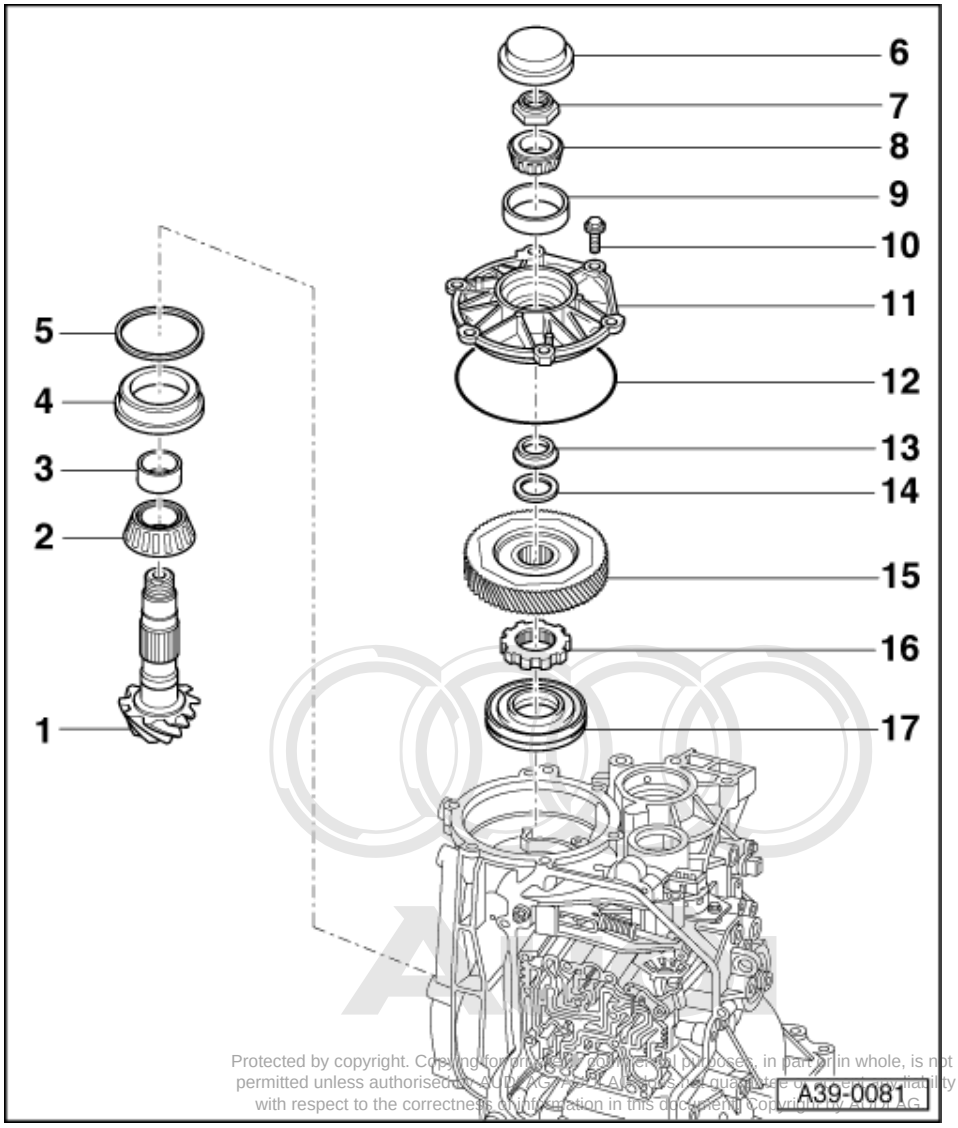
1 **Drive pinion1)**
- To remove, remove differential =>Page 176
- Is mated to crown wheel. Renew complete drive set if damaged.
- Number of teeth => from page 2
- Adjusting crown wheel and drive pinion => Page 198
- Inserting =>Fig. 173

2 **Taper roller bearing inner race1)**
- WIth roller cage
- Pulling off =>Fig. 173
- Pressing on =>Fig. 173

3 **Bush for drive pinion1)**
- Pull off with taper roller bearing inner race =>Fig. 173
- Pressing on

=>Fig. 173



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4 Taper roller bearing outer race1)

- Drive out with drift
- Pulling in
  =>Fig. 174

5 Shim "S3"

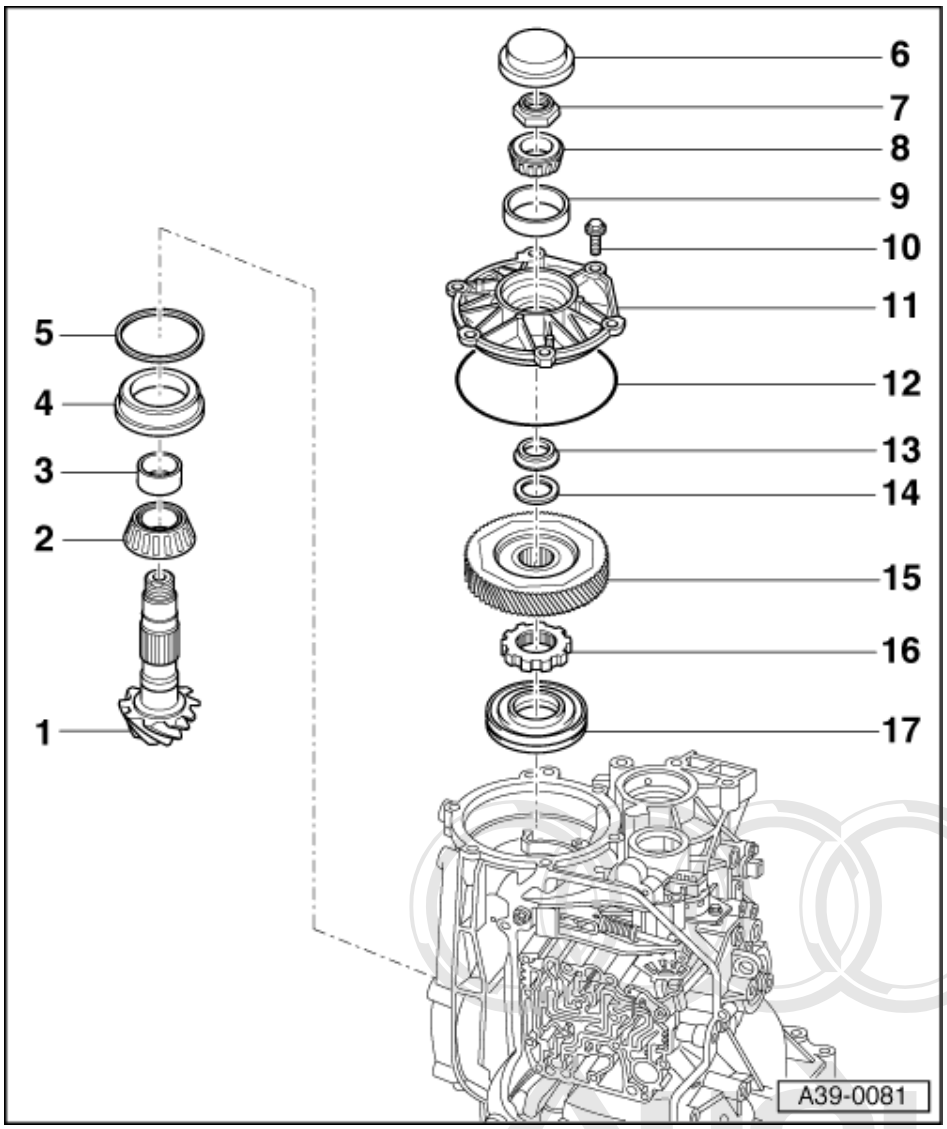
- Note thickness
- Adjustment overview
  =>Page 194

6 Sealing cap

- Driving out
  =>Fig. 175
- Driving in
  =>Fig. 175

7 Hexagon nut

- Renew
- Engage parking lock to slacken or tighten
- Tightening torque=>Page 201 , Adjusting drive pinion
- Secure by peening after checking friction torque
  =>Fig. 175



8 Taper roller bearing inner race1)

- With roller cage

9 Taper roller bearing outer race1)

- Drive out with drift
- Pressing in
  =>Fig. 175

10 Bolt - 25 Nm

- Insert with locking fluid
  AMV 188 200 03
- Tighten in stages and diagonally

11 Cover for drive pinion1)

- To remove cover with gearbox installed, unbolt retainer for connectors. On 4-cylinder engine also remove rear gearbox support=>Page 36

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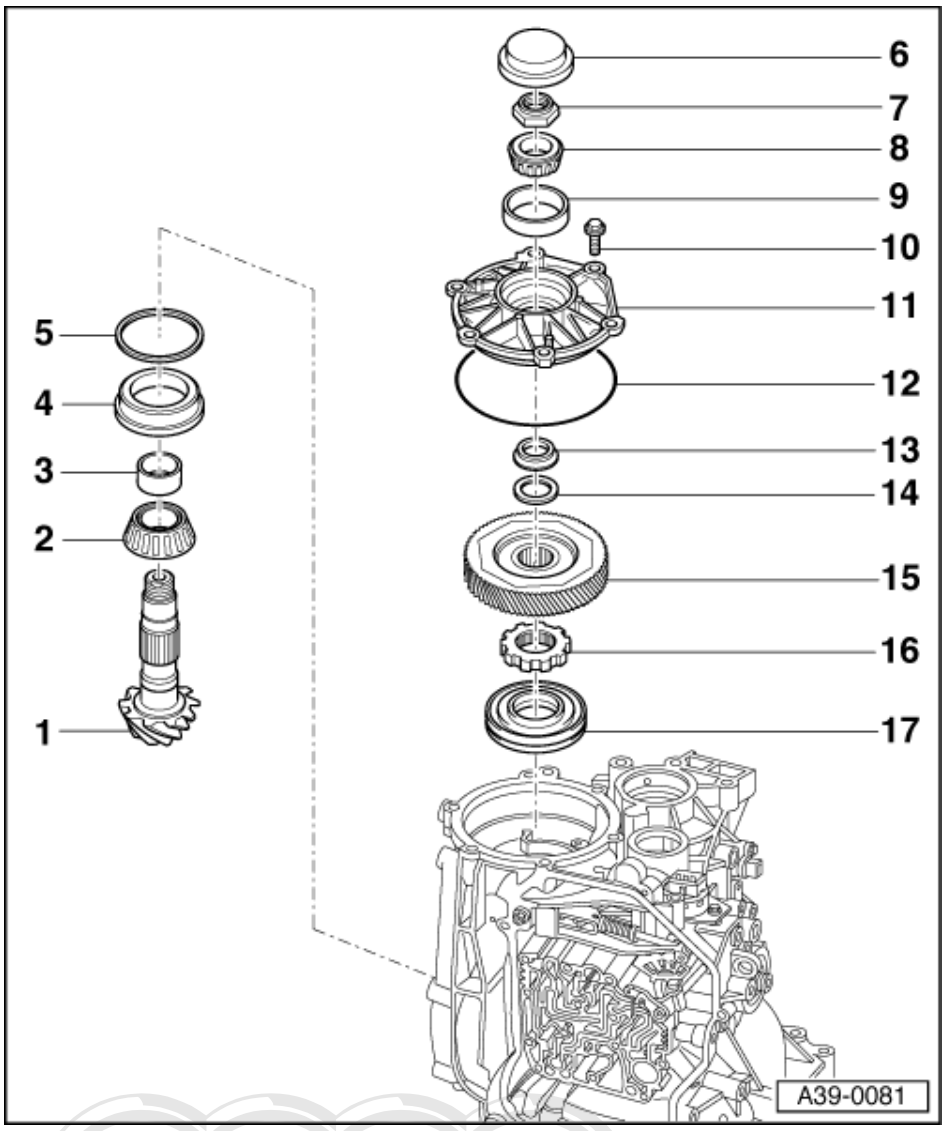

12 O-ring

- Renew
- Can be renewed with gearbox installed

13 Spacer tube1)

- Install with larger shoulder facing toward output gear

14 Shim "S4"

- Note thickness
- Adjustment overview
  =>Page 194

15 Output gear1)

- Number of teeth =>from Page 2
- Pulling off
  =>Fig. 174
- Heat before installing
- If signs of damage exist, always replace input gear and output gear together
- Install with raised collar facing toward parking lock gear

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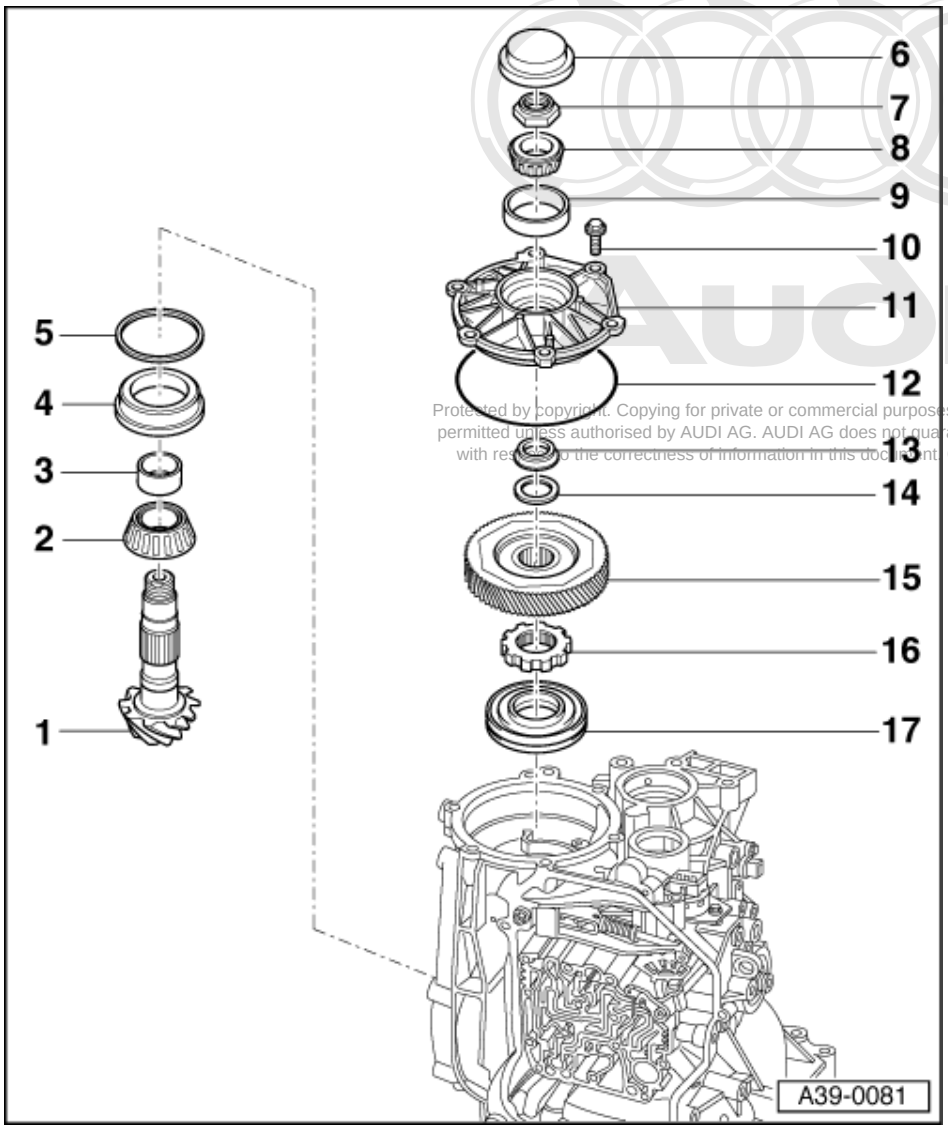

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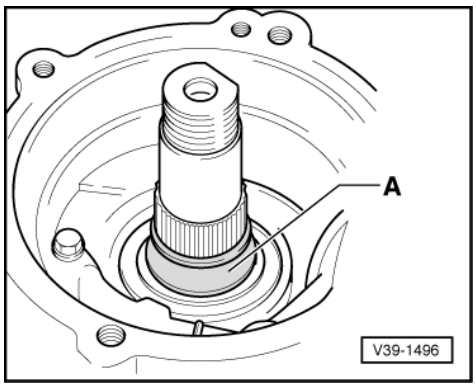
16 Parking lock gear1)

- Install with rounded side facing toward output gear

17 Oil seal for drive pinion

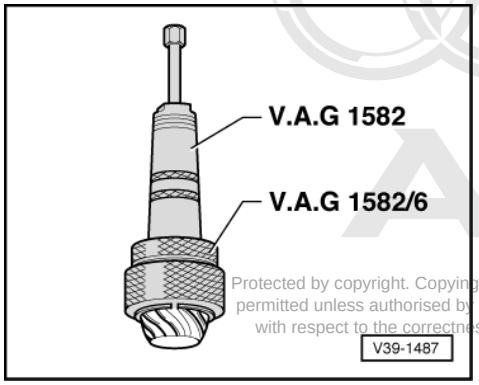
- Drive out with drift
- Always replace
- Oil seal should be installed dry
- Do not oil or grease sealing lips
- Driving in
  =>Fig. 174



-> Fig.1 Inserting drive pinion

Use assembly sleeve 3187 to avoid damaging sealing lips when inserting drive pinion.

A - Assembly sleeve 3187



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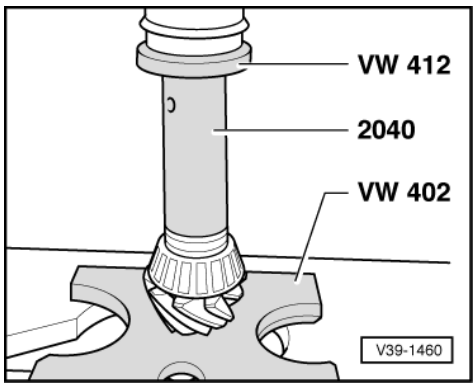
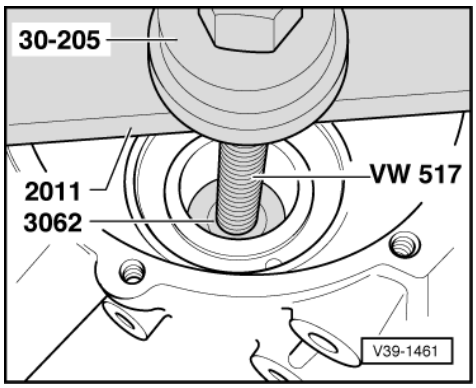
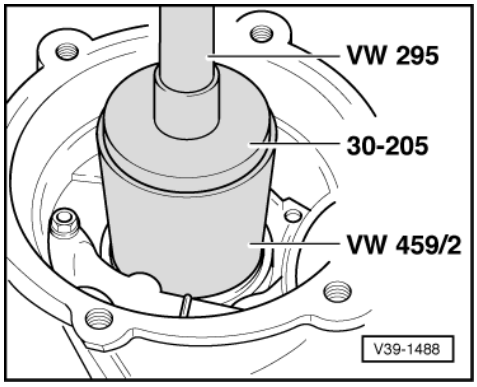
-> Fig.2 Pulling off taper roller bearing inner race with bush for drive pinion



-> Fig.3 Pressing on taper roller bearing inner race with bush for drive pinion



-> Fig.4 Pulling taper roller bearing outer race into gearbox housing

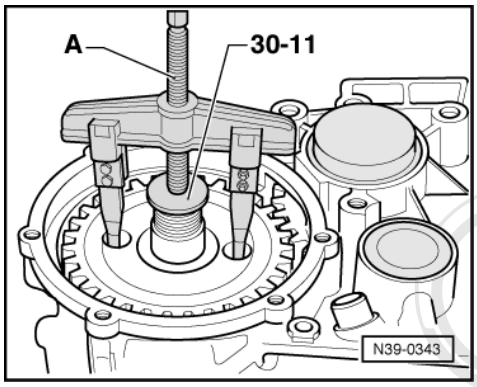


-> Fig.5 Driving in drive pinion oil seal onto stop

Note:

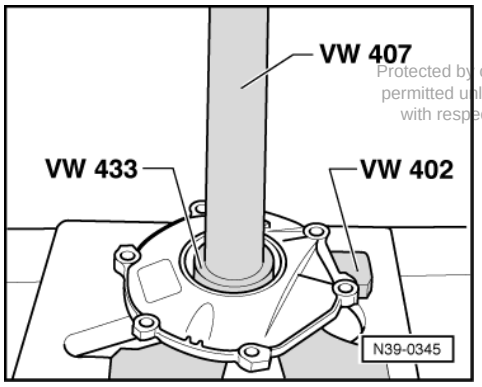
Oil seal should be installed dry; do not grease or oil sealing lips.

- Drive in seal as far as stop.
  - Install with raised collar (inner side) facing toward parking lock gear



-> Fig.6 Pulling off output gear from drive pinion

A - Kukko 20-10 and pulling hook Matra V 172



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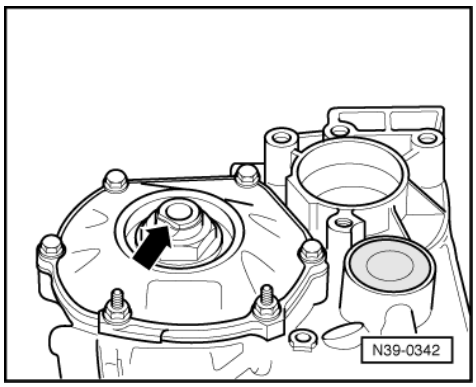
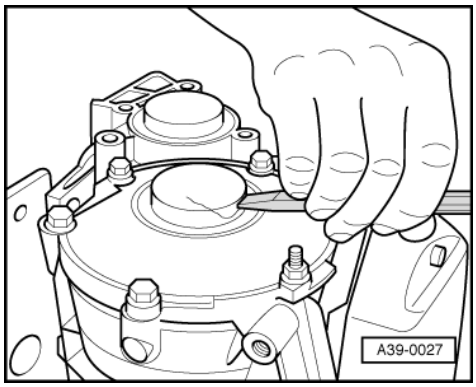
-> Fig.7 Pressing in taper roller bearing outer race



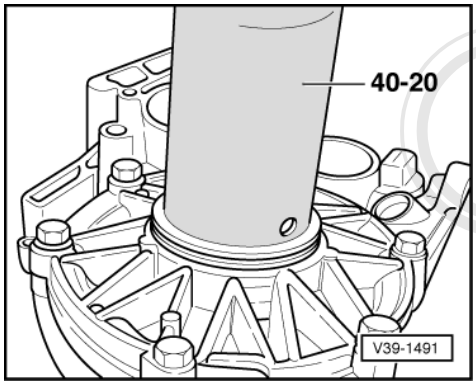
-> Fig.8 Peening hexagon nut

- Secure collar of hexagon nut by peening against flat face of drive pinion -arrow- using a punch.



-> Fig.9 Driving out sealing cap

The sealing cap is damagedwhen it is removed.



-> Fig.10 Driving in sealing cap

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- Drive in new sealing capwith 40-20 as far as stop.

3.5 - Removing and installing differential

Notes:

- With the exception of the differential and the cover for the axle breather, all parts shown in this illustration can be removed with the gearbox installed.
- If the same final drive set and taper roller bearings are to be re-installed after a repair, measure the backlash=>Page 211 . Note these measurements in order to check the friction torque after the repair is completed.
- Cross-section view=>Page 192 .

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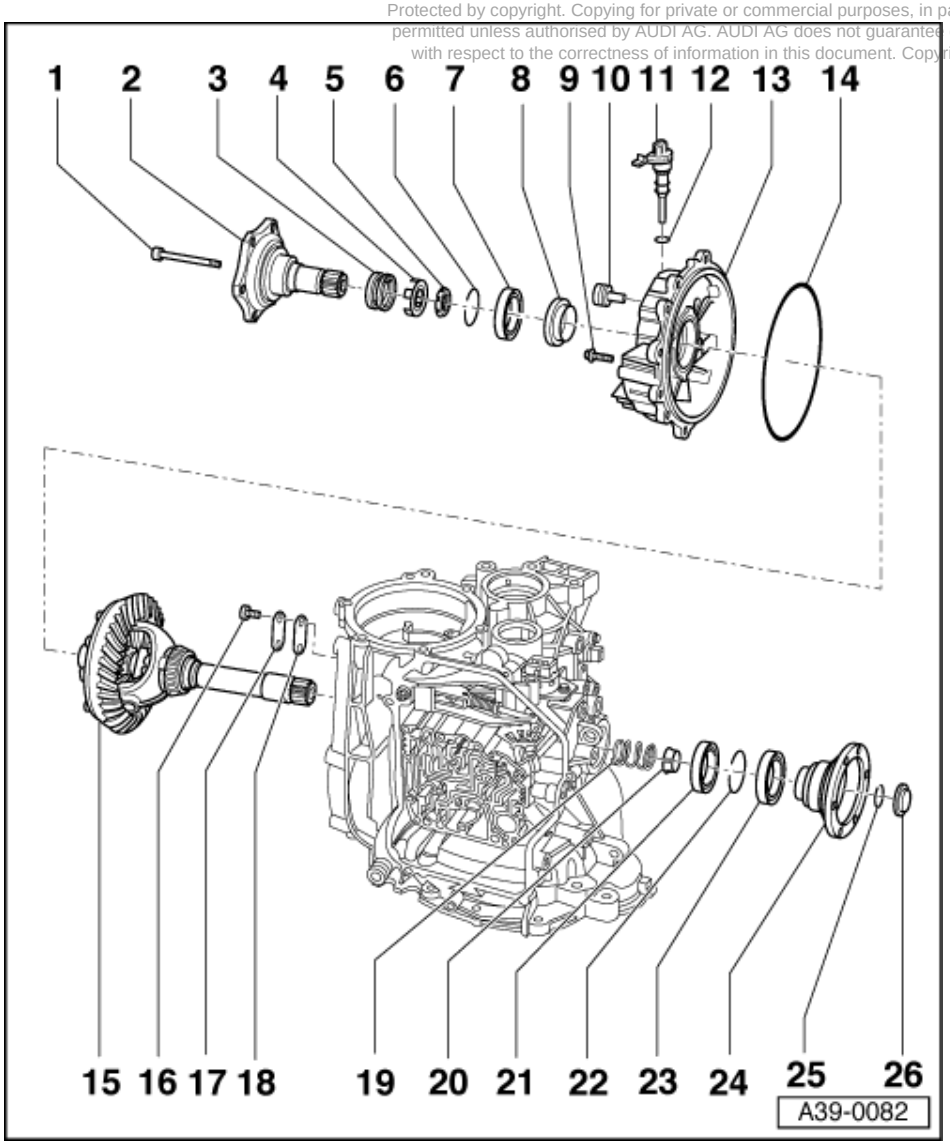
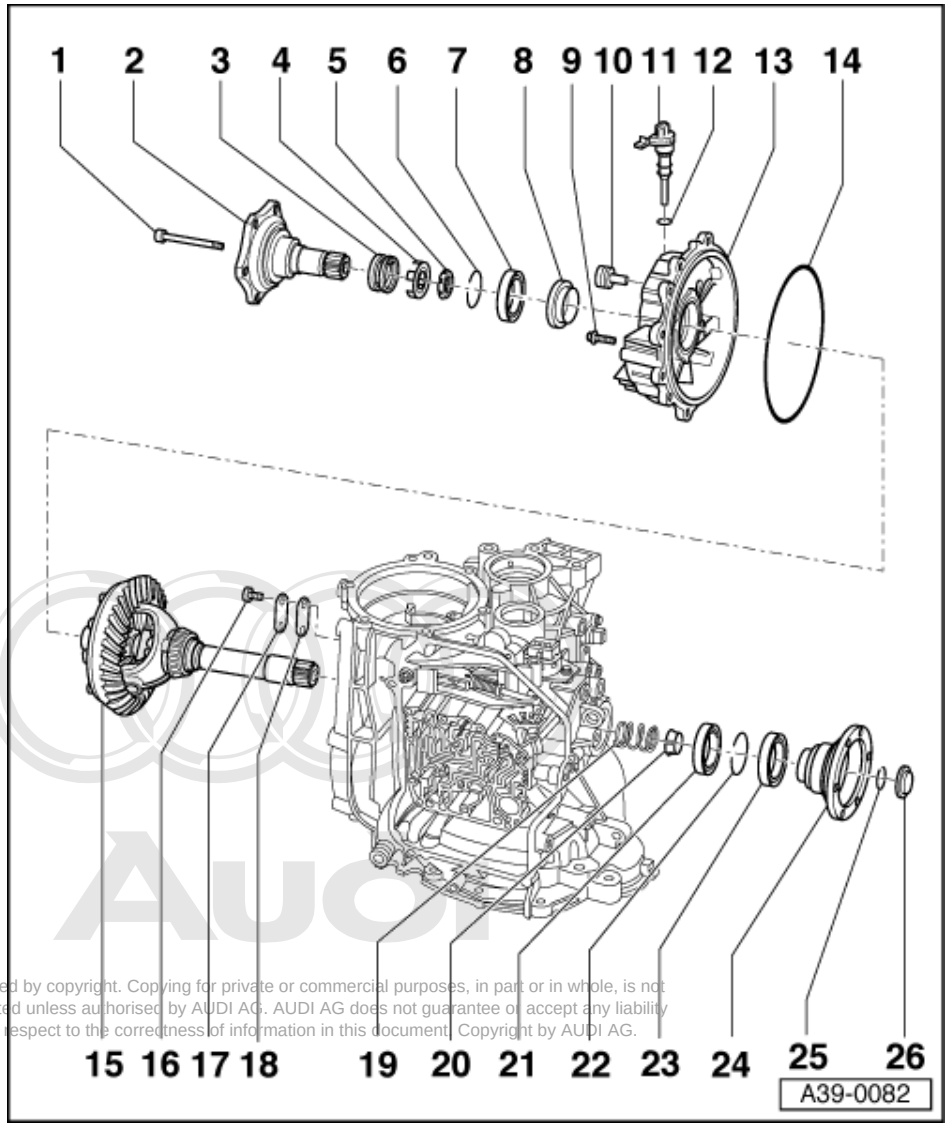


1 Bolt - 30 Nm
2 Flange shaft
- Removing and installing
  => from Page 154

3 Spring
4 Thrust washer
- Install with collar towards spring and tabs towards tapered ring
- Insert in supporting ring

5 Tapered ring
- With grooves to secure thrust washer

- Installation position: Taper towards differential housing



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6 Circlip

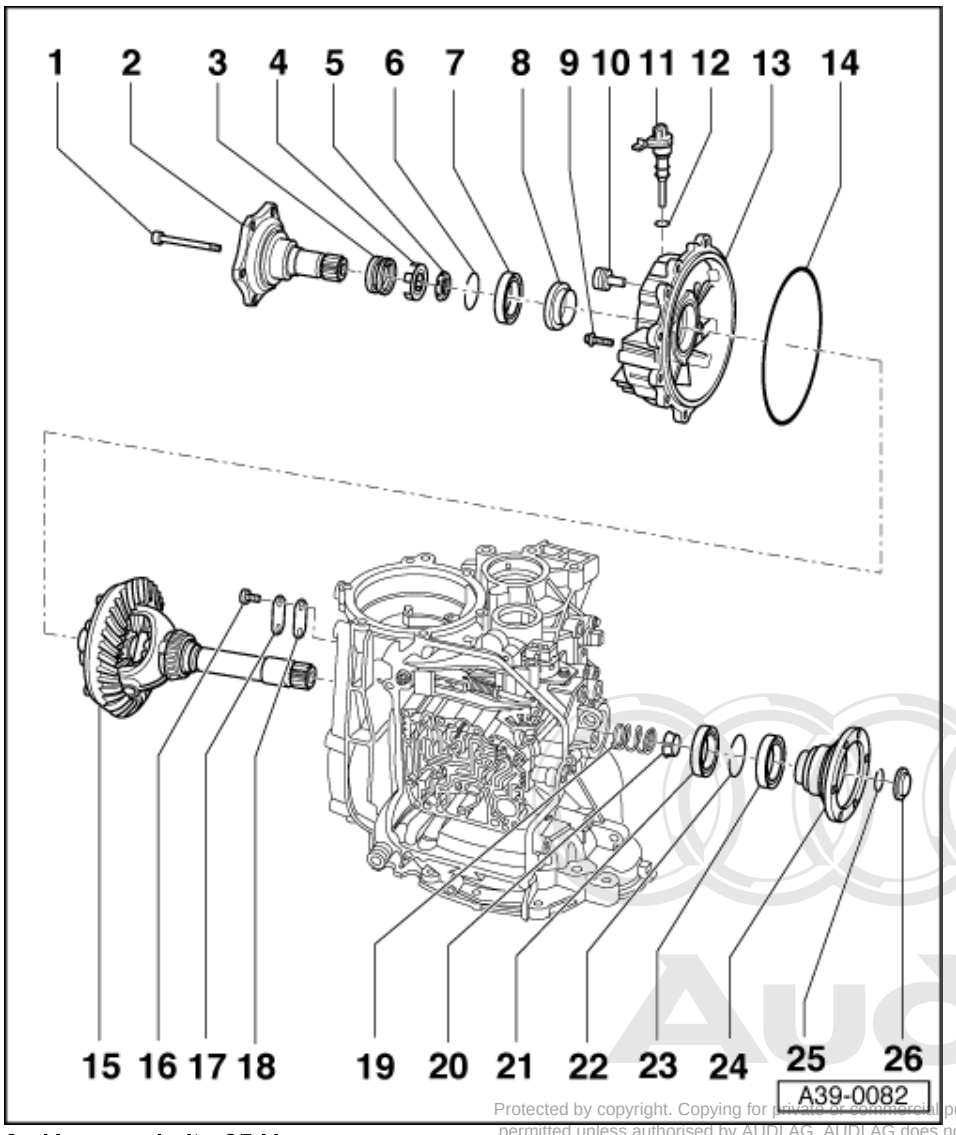
- Holds spring, thrust washer and tapered ring in position

7 Oil seal for flange shaft

- Renew=>Page 154

8 Drive gear

- For speedometer sender -G22
- Remove oil seal for flange shaft before removing and installing
- Install so that lugs on inner circumference face flange shaft; the taper faces differential



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9 Hexagon bolt - 25 Nm

- Insert with locking fluid AMV 188 200 03
- Tighten in stages and diagonally

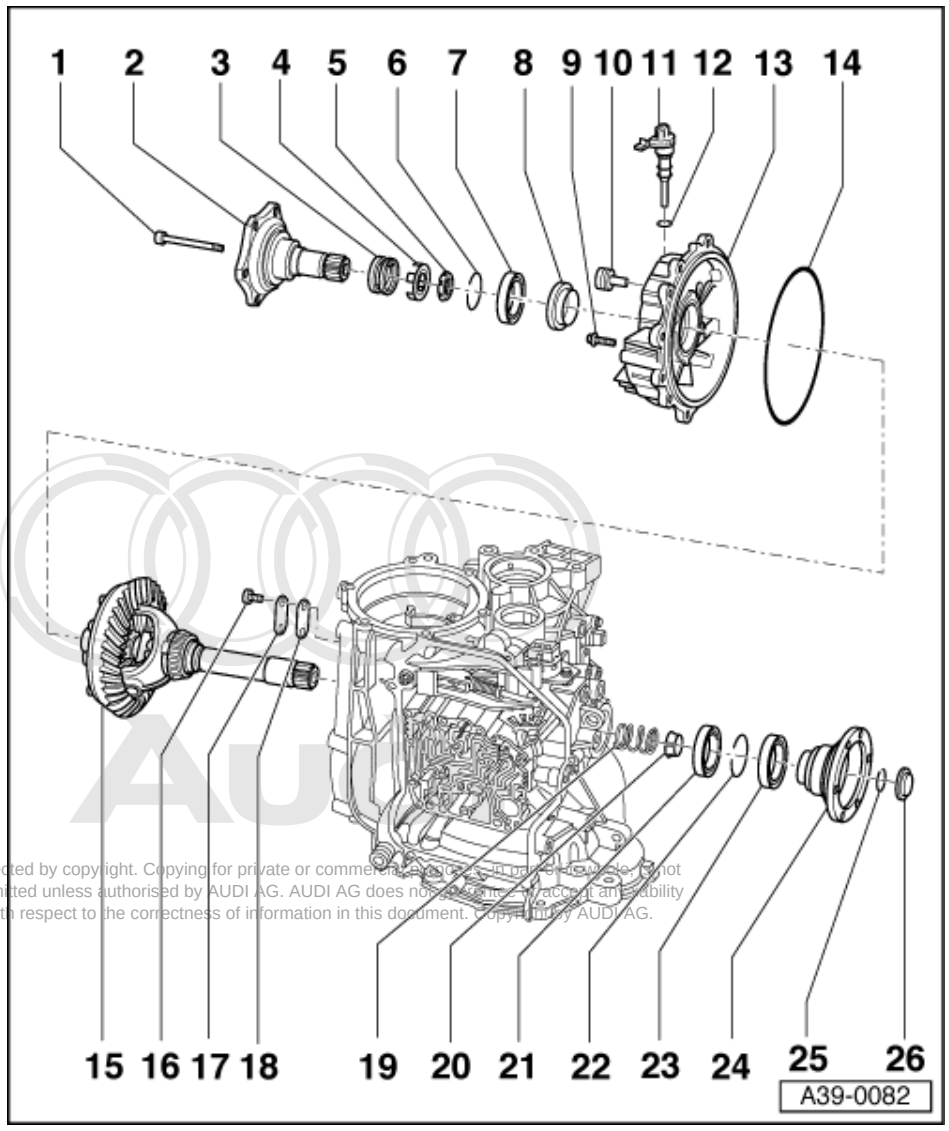
10 Oil filler plug - 25 Nm

- Clean metal particles off magnet

11 Speedometer sender -G22

12 O-ring

- Renew



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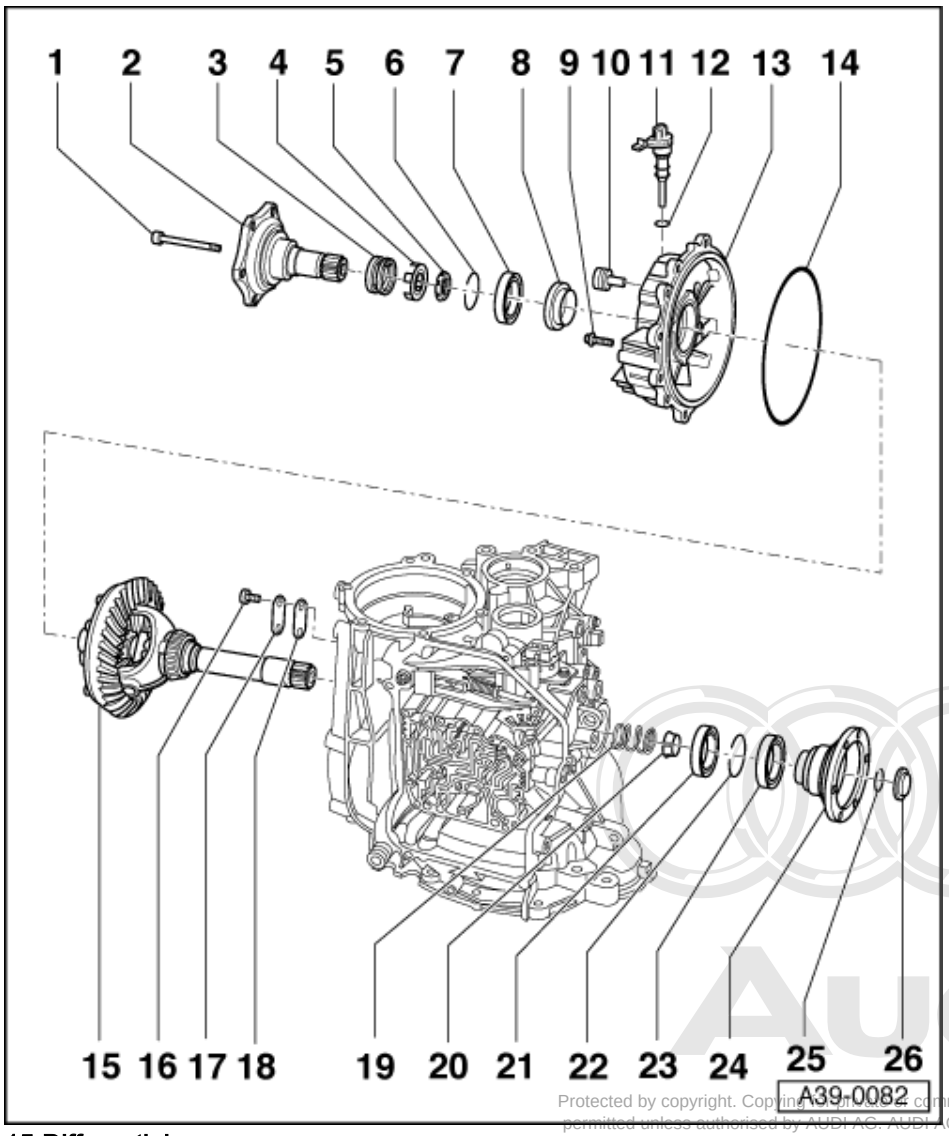
13 Cover for differential

- When replacing, re-determine shim "S1" for crown wheel
  =>from Page 209
- To remove with gearbox installed, remove input shaft and left flange shaft. On 6-cylinder engines, also remove left gearbox support
  =>Page 36

14 O-ring

- Renew
- Can be renewed with gearbox installed



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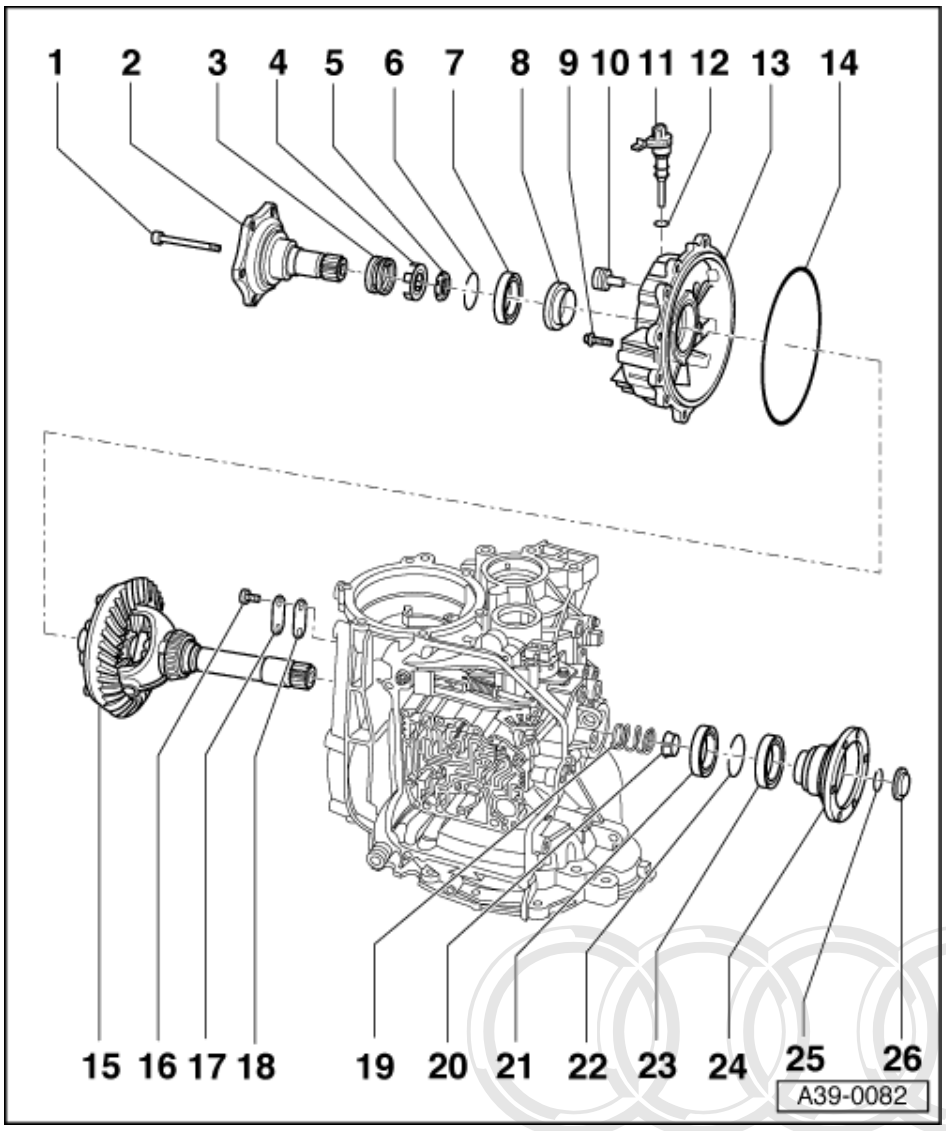
15 Differential

- Remove with gearbox removed
- Remove cover for differential and right drive flange to remove differential
- Dismantling and assembling
  =>Page 183
- The tapered ring has to be removed before installing
- Re-determine shims "S1", "S2" and also shims "S3" and "S4" (for drive pinion) after renewing differential

16 Bolt - 10 Nm



17 Cover

- For axle breather

18 Seal

- Renew

19 Spring

- When differential is installed, pull in together with grooved ball bearing -Item 159

20 Tapered ring

- Installation position: Stepped collar faces grooved ball bearing
- When differential is installed, pull in together with grooved ball bearing and spring =>Page 159

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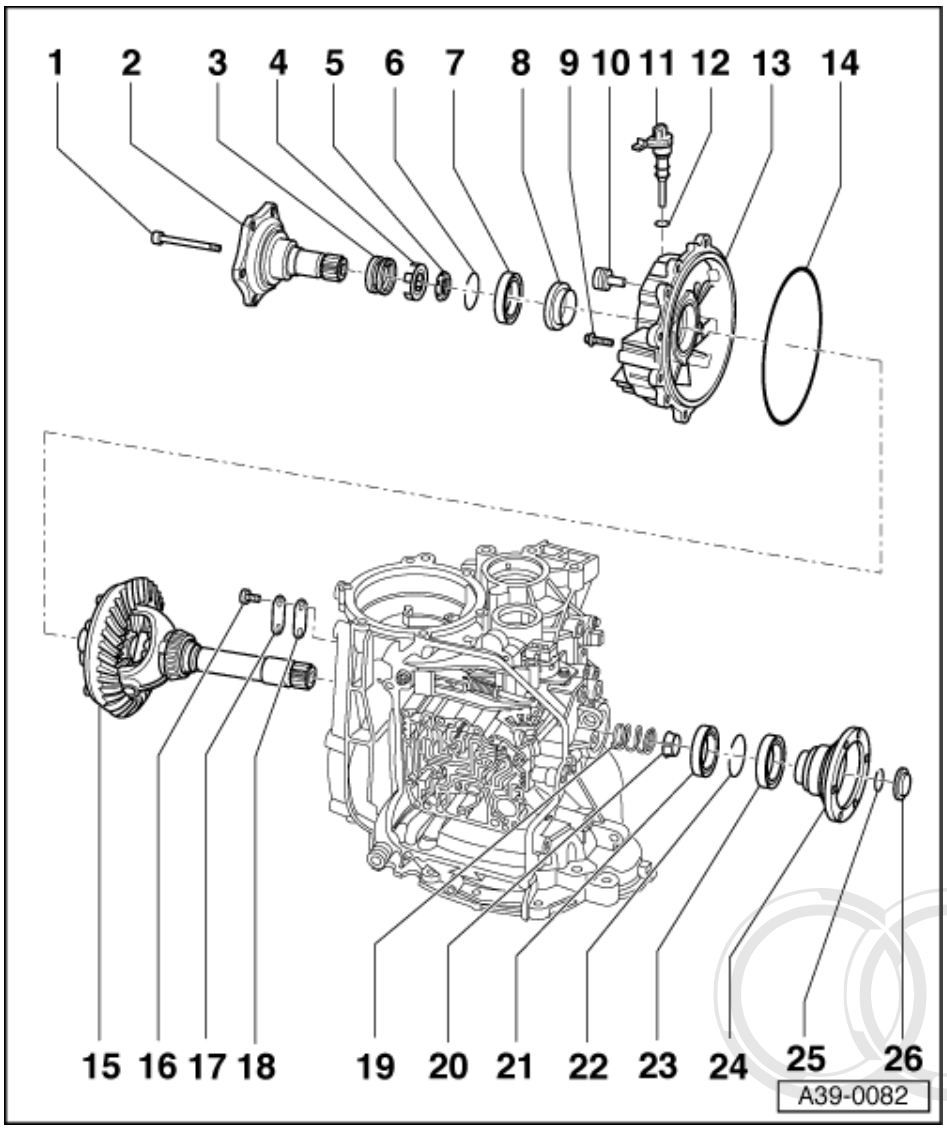

21 Grooved ball bearing

- Removing and installing
  => from Page 158

22 Circlip

- Lever out with screwdriver

23 Oil seal for drive flange

- Removing and installing
  => from Page 156

24 Drive flange

- Removing and installing
  => from Page 156

25 Circlip

26 Sealing cap

- Renew
- To remove sealing cap, pierce with screwdriver and prise off
- Drive in with socket attachment 30 mm A/F

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3.6 - Dismantling and assembling differential

Notes:

- Crown wheel and drive pinion may only be replaced together.
- If the differential taper roller bearings, differential housing or final drive cover are renewed, re-determine thickness of shims "S1" and "S2" for differential => Page 209 .
- If the crown wheel (with drive pinion) is renewed, re-determine thickness of shims "S1" and "S2" and shims "S3" and "S4" (for drive pinion)=> Pages 201 .
- Always replace all taper roller bearings on the same shaft together, with bearings made by the same manufacturer.
- Do not interchange outer or inner races of bearings which are the same size.
- Adjustments are required when replacing components marked1) =>Adjustment overview Page 194.

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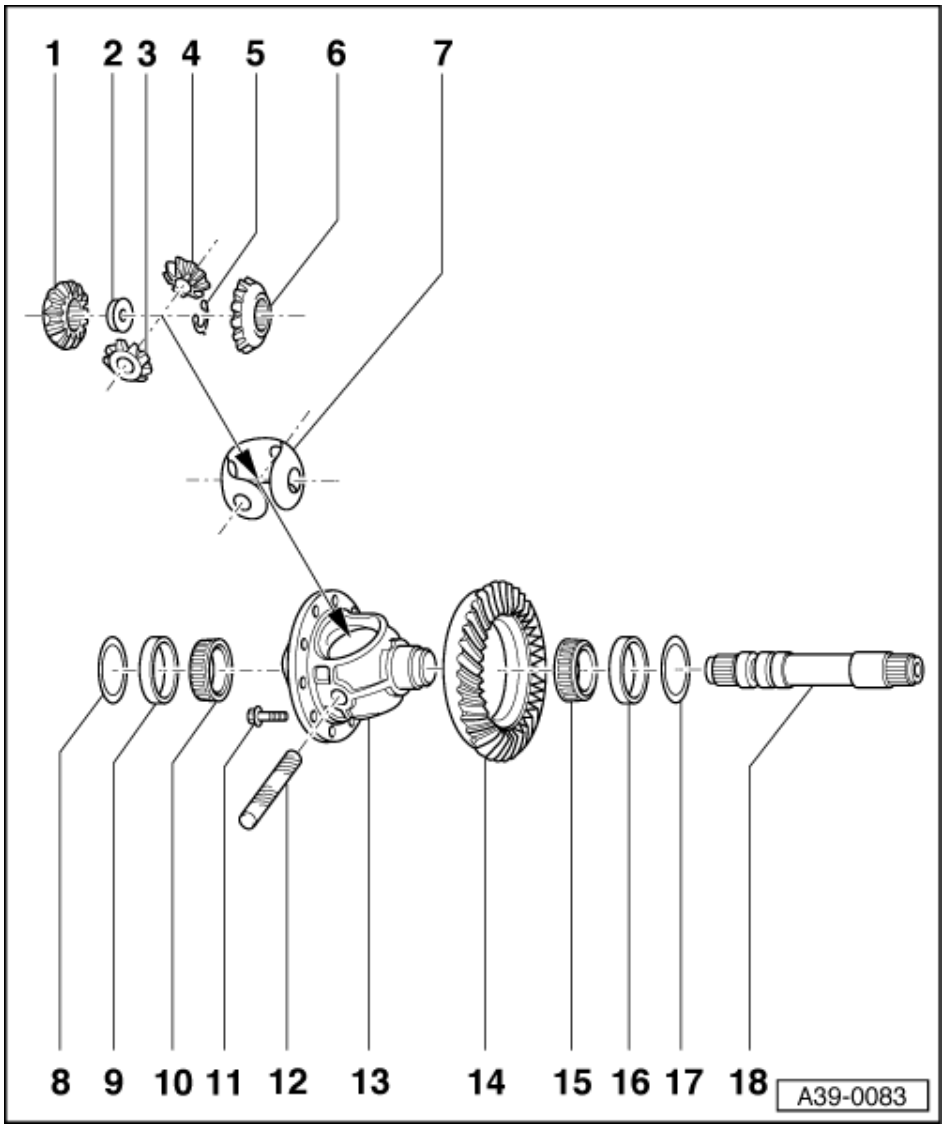


1 Sun wheel

- Removing and installing => from Page 189

2 Threaded piece

- When installing, fit lugs in sun wheel.
- Insert before inserting shaft for bevel gears

3 Planet pinion

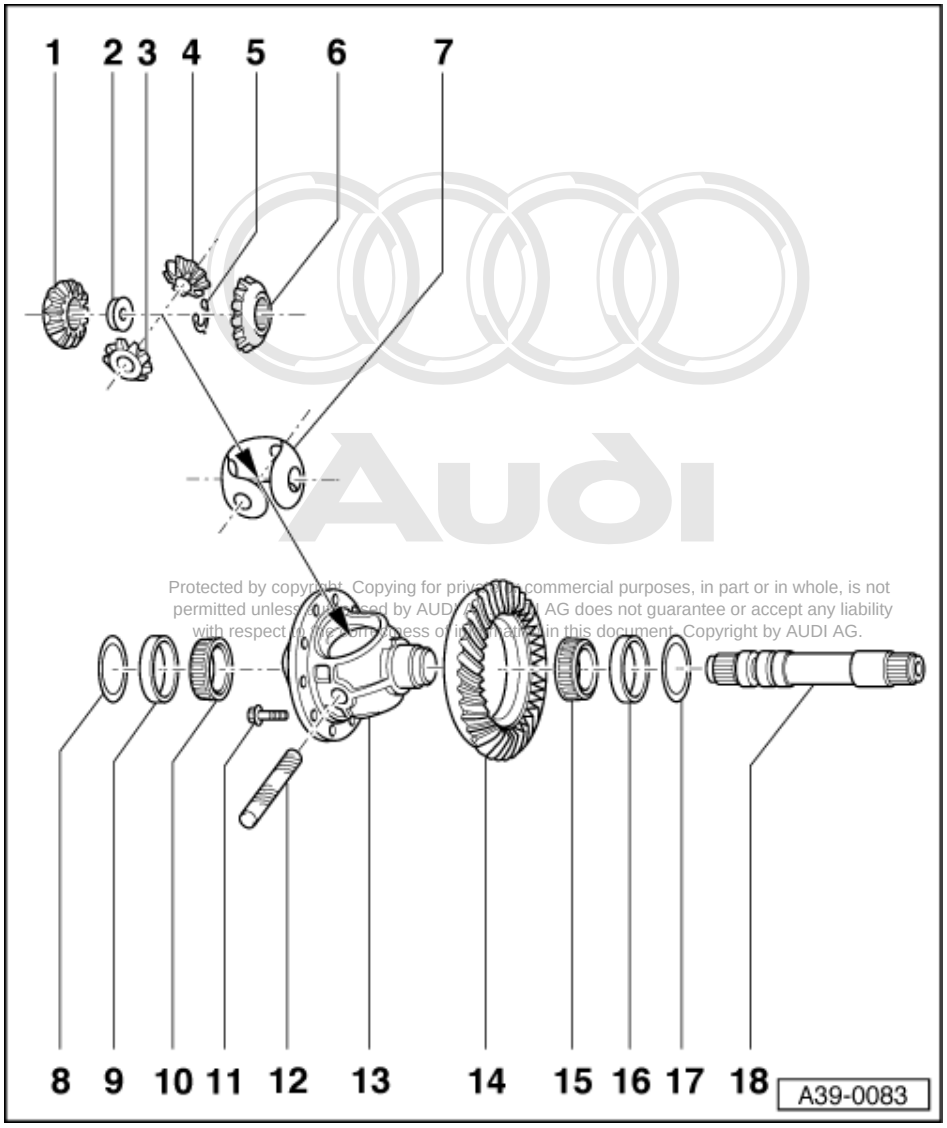
- Removing and installing => from Page 189

4 Planet pinion

- Removing and installing
  => from Page 189

5 Circlip

- For output shaft-Item 18 -



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6 Sun wheel

- Removing and installing
  => from Page 189

7 One-piece thrust washer

- Removing and installing
  => from Page 189
- Lubricate with gear oil and insert in gearbox housing before installing bevel gears

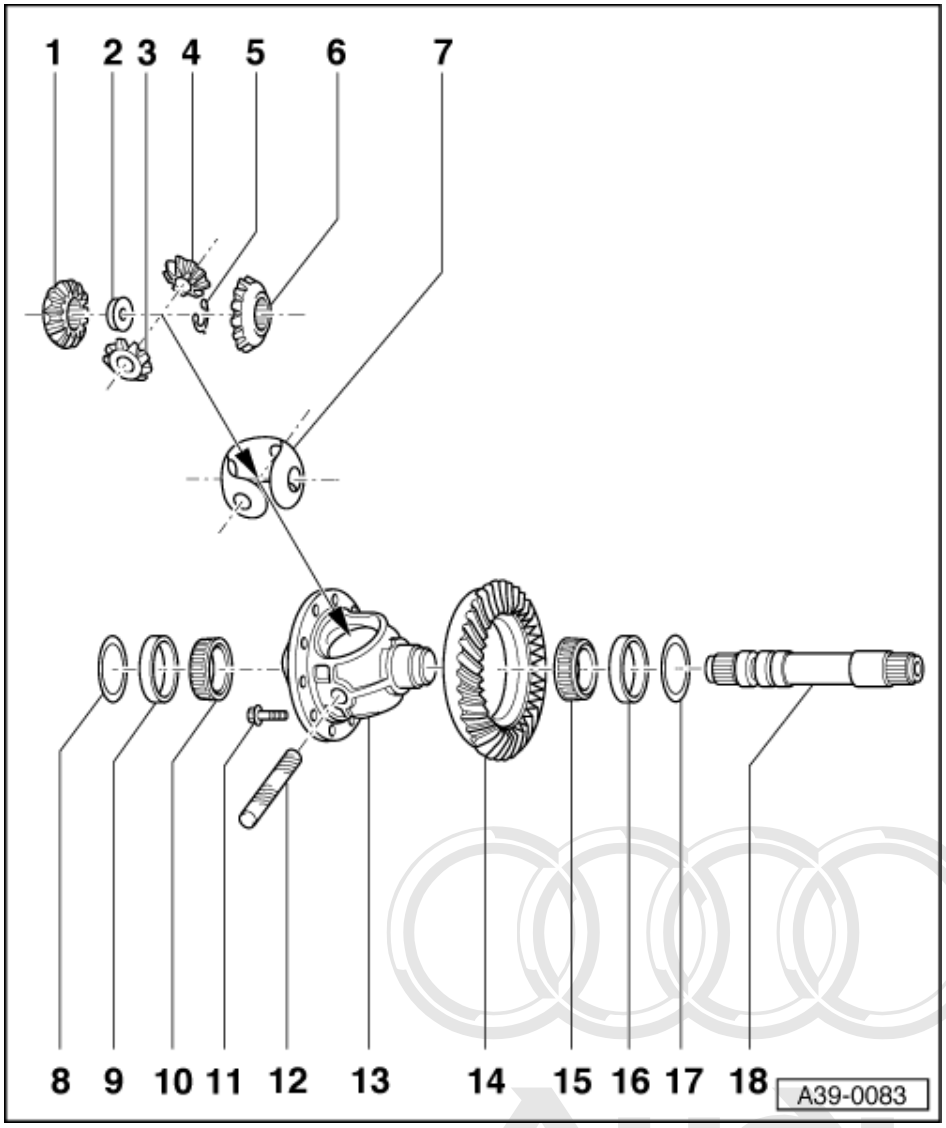
8 Shim "S1"

- Note thickness
- Adjustment overview
  =>Page 194

9 Taper roller bearing outer race1)

- Knock out with drift
- Pressing in

=>Fig. 188



10 Taper roller bearing inner race1)

- With roller cage
- Pulling off
  =>Fig. 188
- Pressing on
  =>Fig. 188

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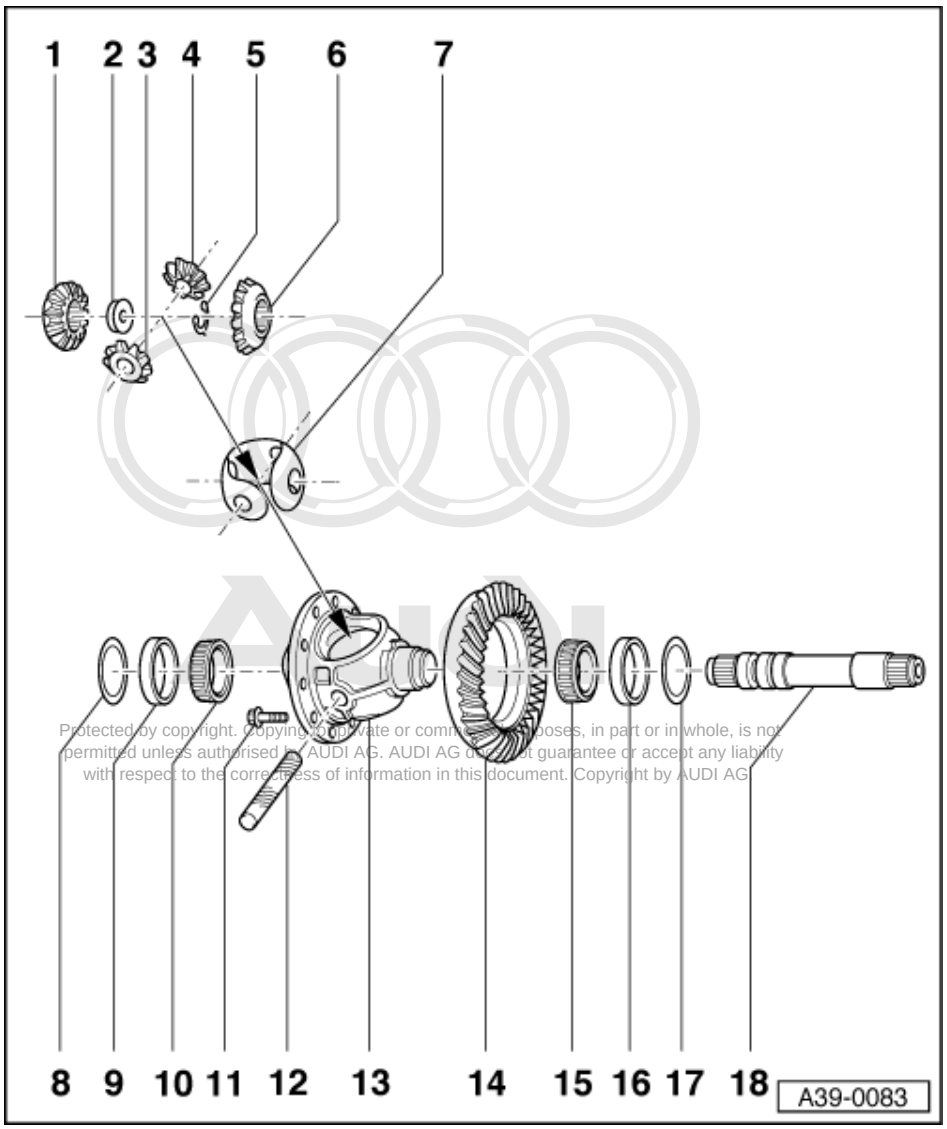
11 Ribbed bolt- 80 Nm + 60°

- Renew

12 Shaft for bevel gears

- Removing and installing
  => from Page 189
- Check for wear; renew if necessary
- When driving in, do not damage one-piece thrust washer



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13 Differential housing 1)

- When replaced, re-determine thickness of shims "S1" and "S2" for differential=> from Page 209

14 Crown wheel 1)

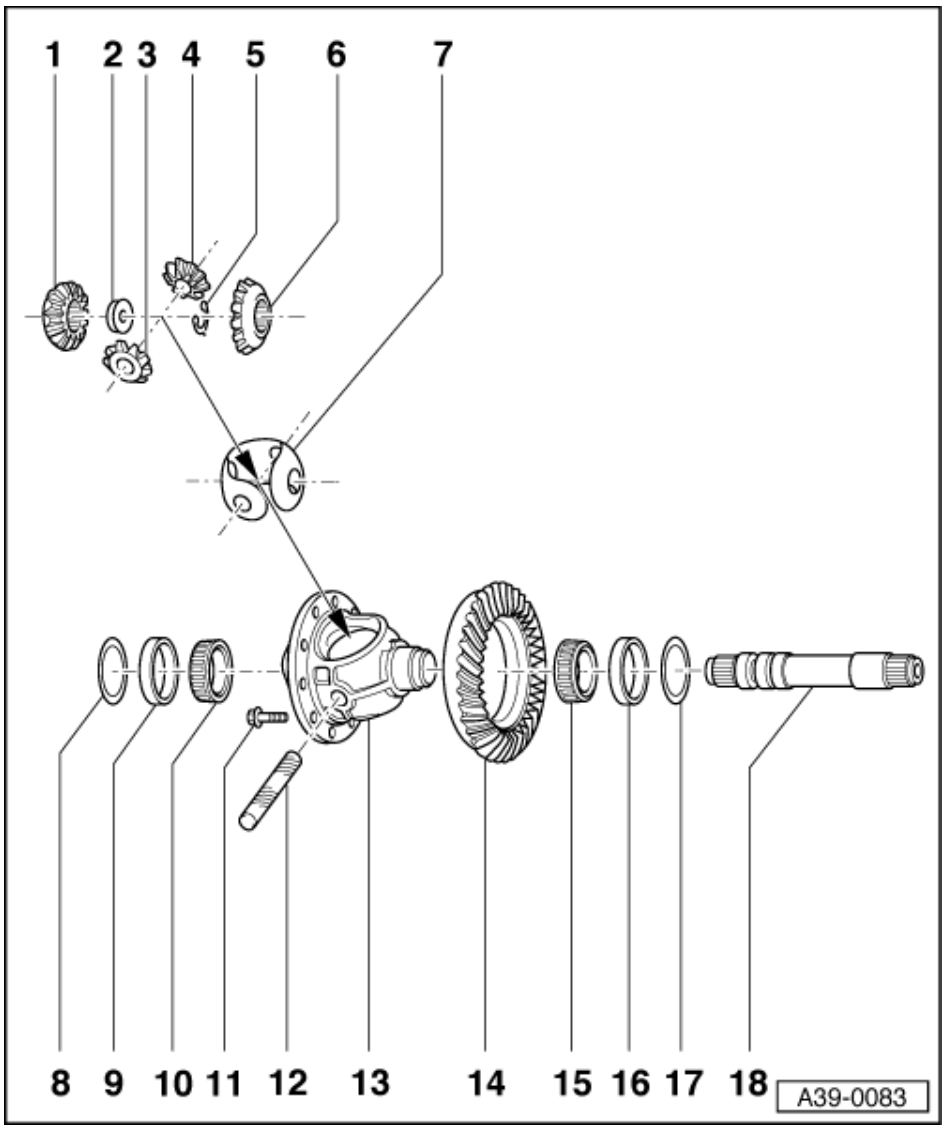
- Paired with drive pinion (final drive set)
- Select correct version according to code letters

=> Parts catalogue

- Number of teeth =>from Page 2
- Drive off differential with a drift
- Installing on differential housing
  => Fig. 189

15 Taper roller bearing inner race1)

- Pulling off
  =>Fig. 188
- Pressing on
  =>Fig. 188



16 Taper roller bearing outer race1)

- Knock out with drift
- Pulling in
  =>Fig. 189

17 Shim "S2"

- Note thickness
- Adjustment overview
  =>Page 194

18 Output shaft for drive flange

- Removing and installing
  => from Page 189

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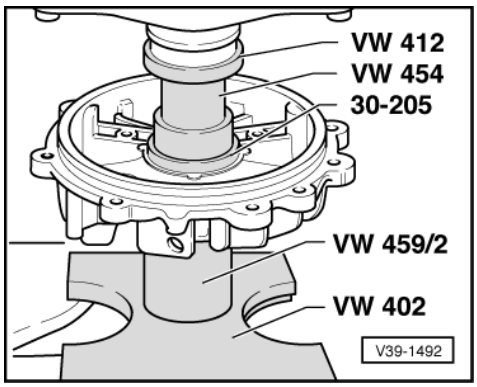
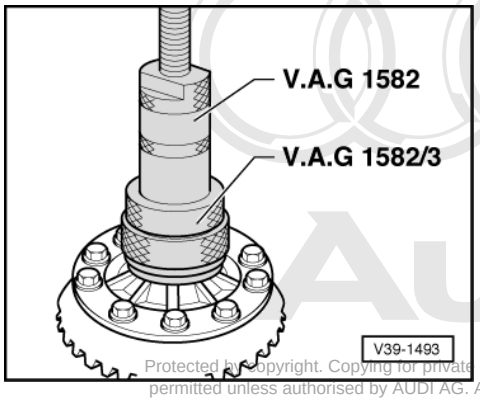


-> Fig.1 Pressing in taper roller bearing outer race



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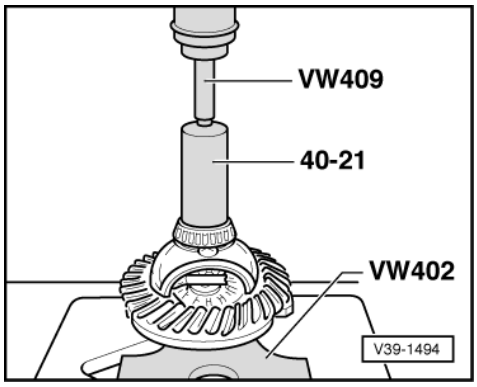
-> Fig.2 Pulling off taper roller bearing inner race

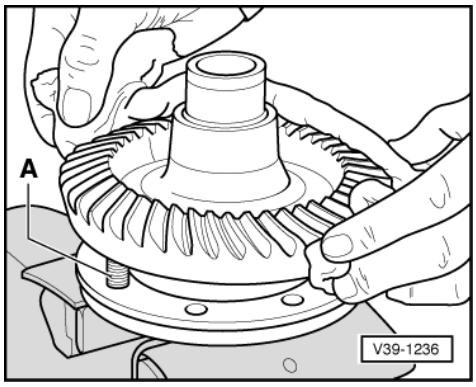
- Place press piece 40-105 on differential housing.



-> Fig.3 Pressing on taper roller bearing inner race

Caution Wear protective gloves.

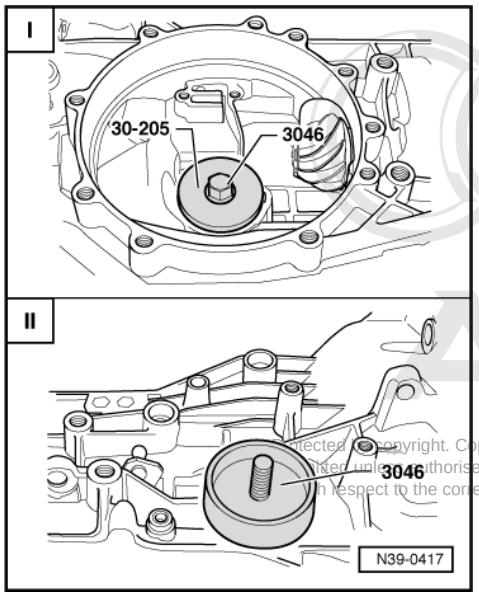
- Heat bearing to approx. 100 °C, fit in position and press home.



-> Fig.4 Installing crown wheel

Caution Wear protective gloves.

- Use 2 centring pins -A- (local manufacture) as a guide.
- Heat crown wheel to approx. 100 °C and install.



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-> Fig.5 Pulling in taper roller bearing outer race

I - Insert taper roller bearing outer race into gearbox housing with press plate 30-205.
II - Connect press piece of puller 3046 to spindle and pull in outer race.

Note:

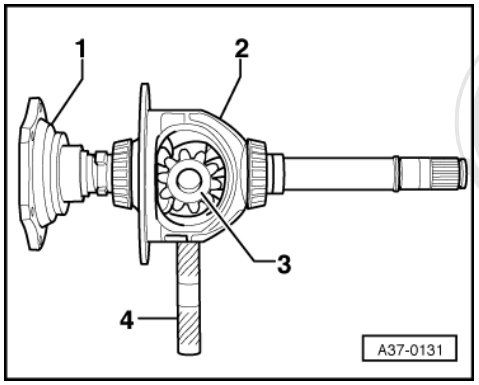
To ensure that bearing race is pulled in straight, knock it in a short distance with a brass drift before applying press plate 30-205.

3.7 - Removing and installing differential bevel gears

- Differential removed.

Dismantling

- Remove bolts on crown wheel and drive crown wheel off differential housing with a drift.



- -> Drive out shaft for bevel gears -4-.
- Remove threaded piece.
- Remove 3 differential bevel gears from differential housing.
- Remove circlip from output shaft for right-hand drive flange.
- Remove 4th differential bevel gear.
- Pull out output shaft for right-hand drive flange.
- Remove one-piece thrust washer from differential housing

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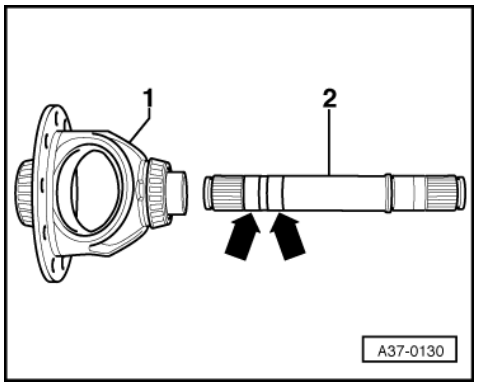
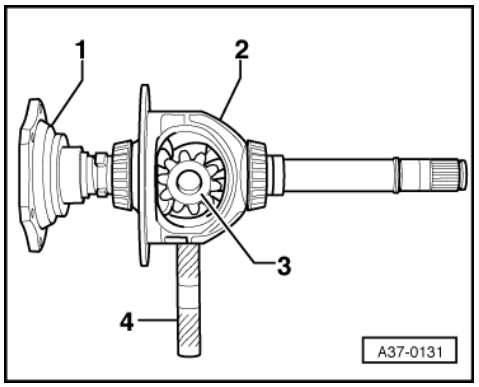
Assembling

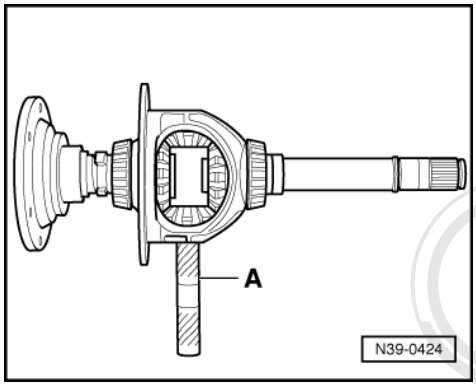


- Lubricate one-piece thrust piece with gear oil and insert in differential housing -1-.
- -> Insert output shaft -2- for drive flange in differential housing -1-.
  - Note installation position: the end with two bearing seats -arrows- faces toward the differential.
- Fit sun wheel on output shaft -2-, and secure on shaft with circlip.



- -> To aid assembly, insert left flange shaft -1- into differential housing -2-.
- Secure sun wheel to left-hand flange shaft with bolt and threaded piece.
- Insert planet pinions -3- spaced 180°apart in openings in differential housing, and hold in place by hand.

- Rotate planet pinions -3- into final position by turning output shaft for drive flange.



- -> Carefully knock in shaft -A- for bevel gears.Ensure one-piece thrust washer is seated properly.
- Install crown wheel=>Fig. 189 .

4 - Adjusting final drive

4.1 - Adjusting final drive

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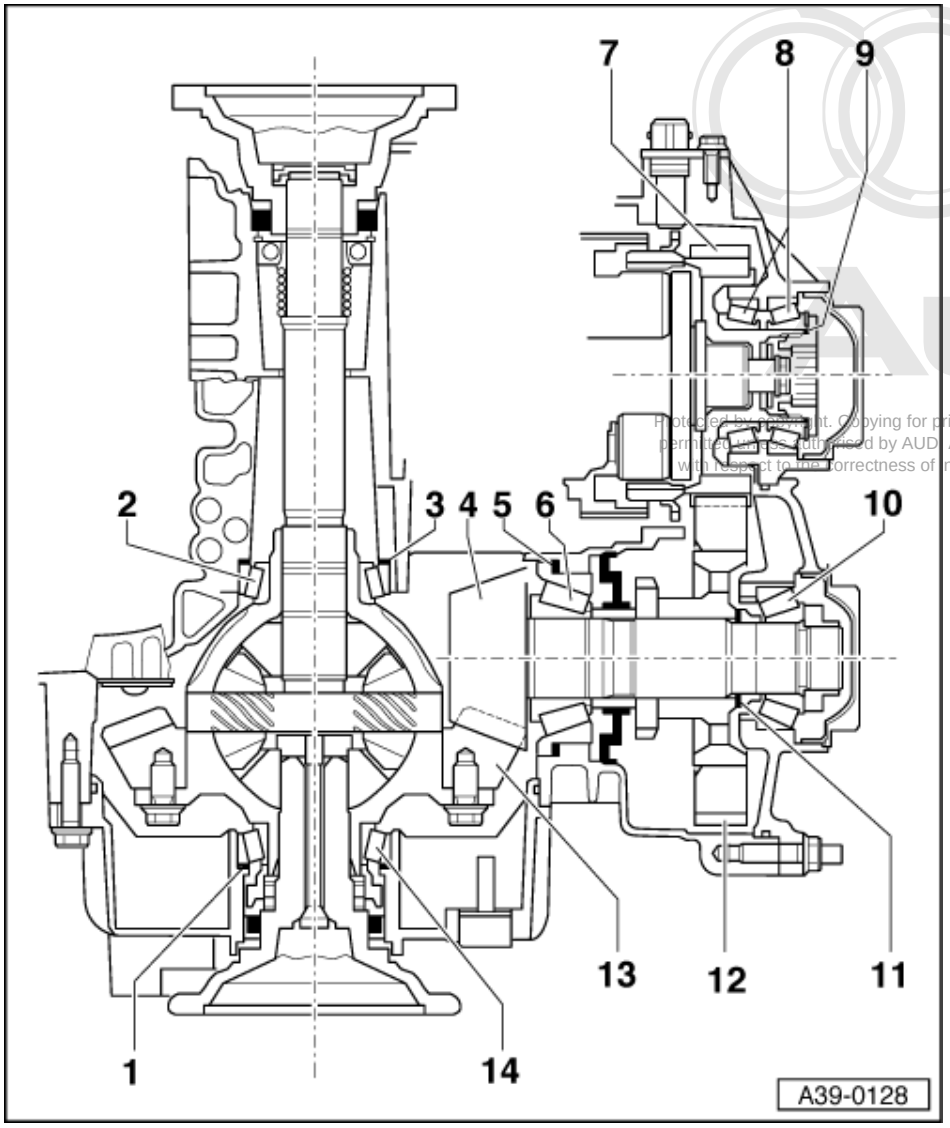
Notes:

- Overview of adjustments required after replacing individual gearbox components=>Page 194 .
- Lubricate all bearings with either gear oil or ATF before fitting, depending on which lubricant they run in when installed. Take special care when lubricating bearings before measuring friction torque.
- Do not interchange outer or inner races of bearings which are the same size.
- Inspect shims for burrs and damage. Do not install damaged shims.
- Check thickness of shims by measuring at several points with a micrometer.

4.2 - Overview of adjustments



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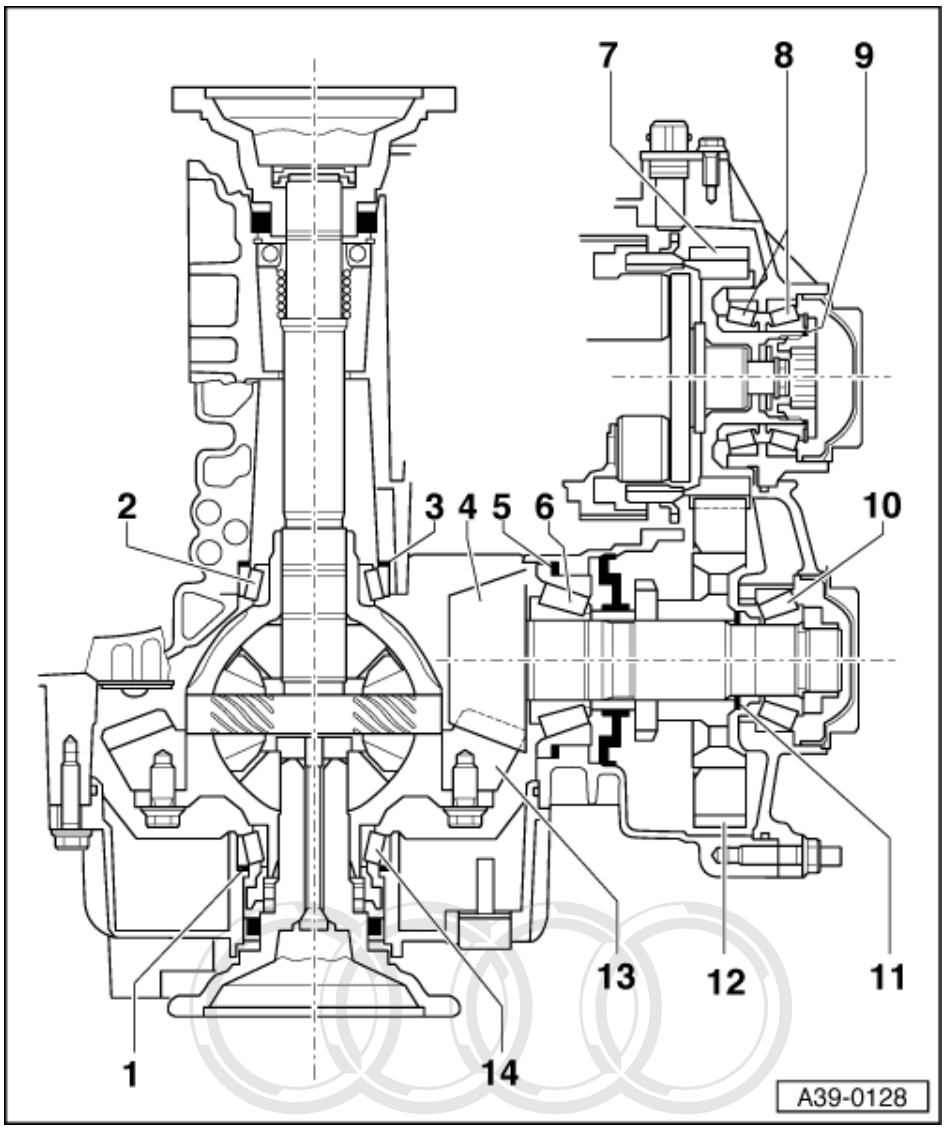
1 Shim "S1" for crown wheel
2 Taper roller bearings for differential
3 Shim "S2" for crown wheel
4 Drive pinion
- Only replace together with crown wheel
- Adjusting crown wheel and drive pinion => Page 198

5 Shim "S3" for drive pinion



6 Large taper roller bearing for drive pinion
7 Input gear
- Only replace together with output gear
- Adjusting => Page 195

8 Taper roller bearings for input gear
9 Shim for input gear
10 Small taper roller bearing for drive pinion
11 Shim "S4" for drive pinion

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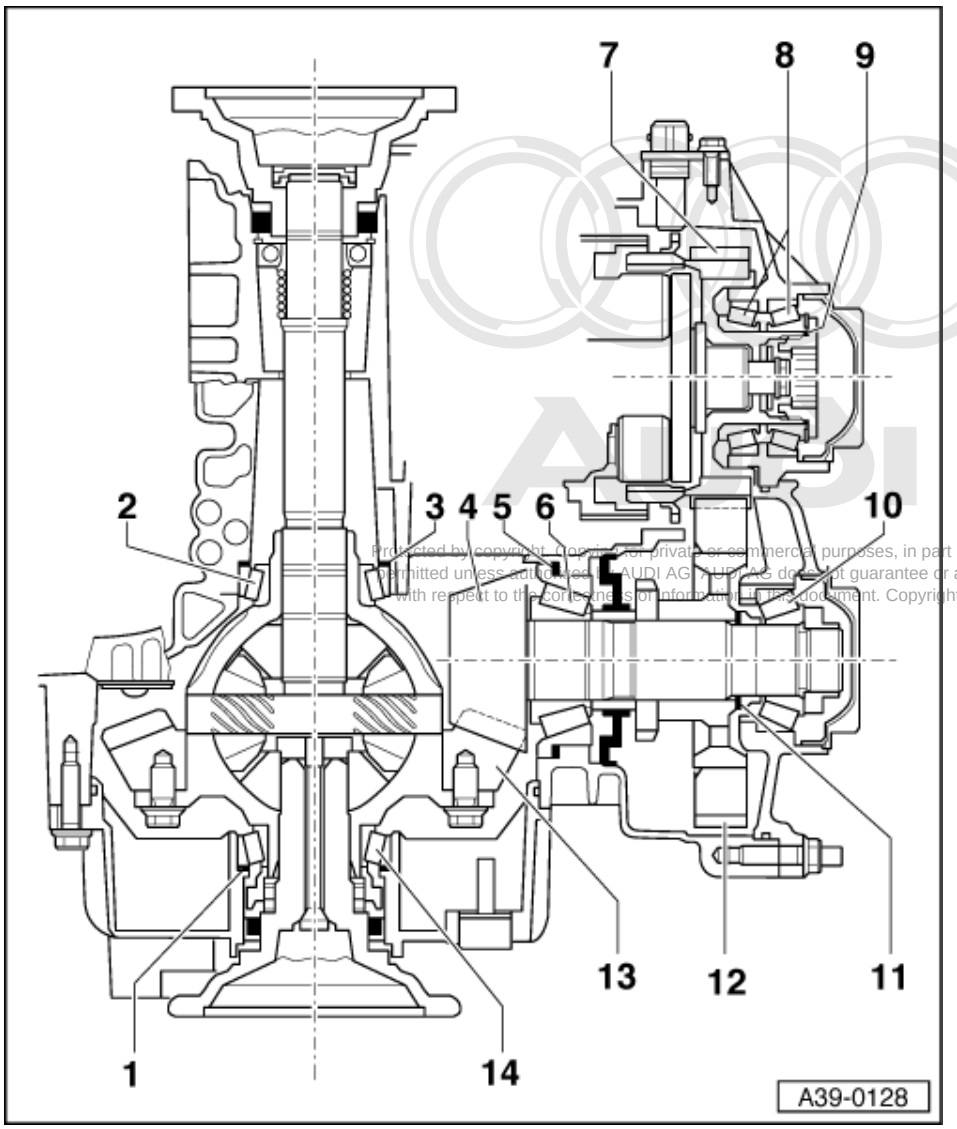

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12 Output gear

- Only replace together with input gear

13 Crown wheel

- Note identification markings
  =>Page 199
- Only replace together with drive pinion
- Adjusting crown wheel and drive pinion => Page 198

14 Taper roller bearings for differential

4.3 - Adjustment overview

Note:

When working on the gearbox, the input gear, the drive pinion with output gear, or the crown wheel with differential housing only require adjustment if individual components have been replaced that directly affect the final drive adjustment. To avoid unnecessary adjustments, observe following table:

	Adjustments required:

Component replaced: ▼	Crown wheel "S1"+"S2" => Page 198	Crown wheel "S1" => Page 209	Drive pinion "S3"+"S4" via "r" => Page 198	Drive pinion "S4" => Page 201	Adjust input gear 1) 3) => Page 195
Gearbox housing	X		X		X
Taper roller bearing for input gear					X
Input gear 1), output gear 1)				X	X
Drive pinion 2), crown wheel 2)	X		X		
Differential housing without crown wheel	X				

1) Always renew input gear and output gear together
2) Always renew drive pinion and crown wheel together
3) When adjusting input gear, re-adjust planet carrier and clutch play between K1 and K2

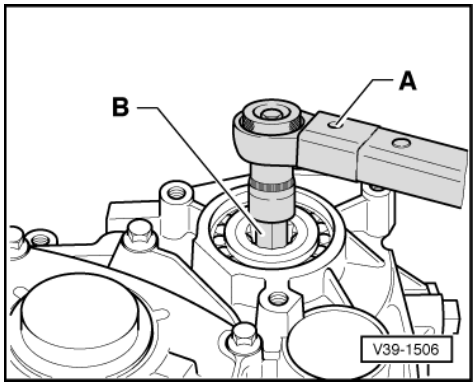
Component replaced: ▼	Adjustments required: Crown wheel "S1"+"S2" => Page 198	Crown wheel "S1" => Page 209	Drive pinion "S3"+"S4" via "r" => Page 198	Dive pinion "S4" => Page 201	Adjust input gear 1) 3) => Page 195
Taper roller bearing for drive pinion			X		
Taper roller bearing for differential	X				
Cover for differential		X			
Drive pinion cover, drive pinion bush, parking lock wheel, spacer tube				X	

1) Always renew input gear and output gear together
3) When adjusting input gear, re-adjust planet carrier and clutch play between K1 and K2

4.4 - Adjusting input gear

- Planetary gearbox removed

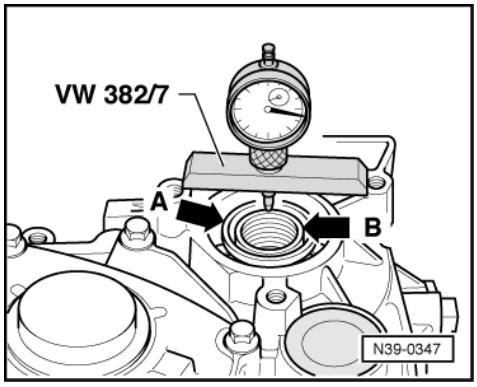
Note:
Measure friction torque at drive pinion nut before and after removing input gear=>Page 197 . Make a note of the friction torque values; they are required for checking friction torque after assembly.
- First insert inner race without locking fluid.
- Then insert outer races for both taper roller bearings with locking fluid AMV 185 101 A1 =>Item 164).
- Insert input shaft with inner race of inner taper roller bearing.



- Engage parking lock.
- -> Tighten socket head fastener to 100 Nm without dished washer and without shim.

A - Torque wrench
B - Socket attachment, 22 mm A/F

- Remove socket head fastener.



- Insert dial gauge and set to zero with 3 mm preload.
- -> Measure distance between input gear -B- and inner race -A- of taper roller bearing, and note dial gauge reading.

• Reading in following example: 1.00 mm.

Determining shim

- Starting from the measured reading, add the thickness of the dished washer and subtract the bearing preload allowance. This will give the specified bearing preload.

Example:

Reading	1.00 mm
+ Dished washer	1.50 mm
- Bearing preload	0.18 mm
= Thickness of shim	2.32 mm

- Select the required shim from the table=>Page 196 : Part numbers

=> Parts catalogue

- Put shim onto input gear.
- Insert axial needle bearing for planet carrier.
  - Installation position: flat side faces toward input gear.
- Fit dished washer.
  - Installation position: convex side faces toward socket head fastener.
- Tighten socket head fastener to 250 Nm.

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Table of shims for input gear

Measured thickness (mm)	Shim (mm)	Measured thickness (mm)	Shim (mm)
1.575 ... 1599	1.600	2.075 ... 2.099	2.100
1.600 ... 1.624	1.625	2.100 ... 2.124	2.125
1.625 ... 1.549	1.650	2.125 ... 2.149	2.150
1.650 ... 1.674	1.675	2.150 ... 2.174	2.175
1.675 ... 1.699	1.700	2.175 ... 2.199	2.200

Measured thickness (mm)	Shim (mm)	Measured thickness (mm)	Shim (mm)
1.700 ... 1.724	1.725	2.200 ... 2.224	2.225
1.725 ... 1.749	1.750	2.225 ... 2.249	2.250
1.750 ... 1.774	1.775	2.250 ... 2.274	2.275
1.775 ... 1.779	1.800	2.275 ... 2.299	2.300
1.800 ... 1.824	1.825	2.300 ... 2.324	2.325
1.825 ... 1.849	1.850	2.325 ... 2.349	2.350
1.850 ... 1.874	1.875	2.350 ... 2.374	2.375
1.875 ... 1.899	1.900	2.375 ... 2.399	2.400
1.900 ... 1.924	1.925	2.400 ... 2.424	2.425
1.925 ... 1.949	1.950	2.425 ... 2.449	2.450
1.950 ... 1.974	1.975	2.450 ... 2.474	2.475
1.975 ... 1.999	2.000	2.475 ... 2.499	2.500
2.000 ... 2.024	2.025	2.500 ... 2.524	2.525
2.025 ... 2.049	2.050	2.525 ... 2.549	2.550
2.050 ... 2.074	2.075		

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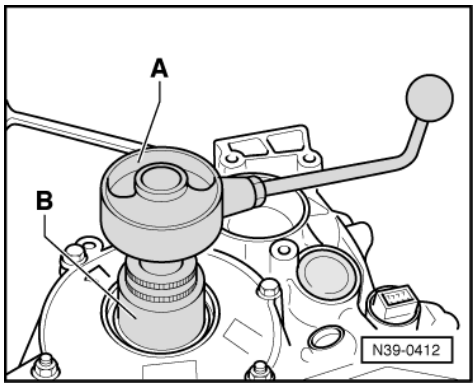
Measuring friction torque (checking setting)

- Planetary gearbox removed; differential installed



- -> Apply 41 mm A/F socket attachment -A- and torque gauge 0 ... 600 Ncm -B- to drive pinion nut.
- Read off friction torque. The friction torque with input gear fitted must be approx. 145 ... 245 Ncm higher than when the input gear is not fitted.

Example:

Friction torque for differential, drive pinion and input gear	415 Ncm
- Friction torque for differential and drive pinion (input gear removed)	210 Ncm
= Friction torque for input gear	205 Ncm

Note:

If used bearings are being re-installed, the friction torque measured after assembly should be the same as the torque measured before dismantling (or up to 80 Ncm higher).

- Remove socket head fastener.
- Remove input gear again => Page 161
- Insert inner race of outer taper roller bearing with locking fluid AMV 185 101 A1.
- Put shim onto input gear.
- Insert axial needle bearing for planet carrier.
  - Installation position: flat side faces toward input gear.
- Insert dished washer.
  - Installation position: convex side faces toward socket head fastener.

- Tighten socket head fastener to 250 Nm.

5 - Adjusting drive pinion and crown wheel

5.1 - Adjusting drive pinion and crown wheel

General notes:

- If the final drive is only being dismantled and re-assembled using the same parts, it is then only necessary to check the friction torque and the backlash.
- Careful adjustment of the drive pinion and crown wheel is important for the service life and smooth running of the final drive. For this reason, the drive pinion and crown wheel are matched together during manufacture, and checked to ensure a good mesh pattern and quiet running in both directions of rotation. The position of quietest running is found by moving the drive pinion in an axial direction and at the same time lifting the crown wheel out of the zero-play mesh position by the amount necessary to maintain the backlash within the specified tolerance.
- The object of the adjustment is to reproduce the setting for quietest possible running, as obtained on the test machine in production.

- The deviation (tolerance) "r", which is related to the master gauge "Ro", is measured for the final drive sets supplied as replacement parts and marked on the outer circumference of the crown wheel. The final drive set (drive pinion and crown wheel) may only be replaced together as a matched pair.
- Observe the general repair instructions for taper roller bearings and shims.
- The frictional torque measurement is only used as a final check to make sure that the adjustment is correct.

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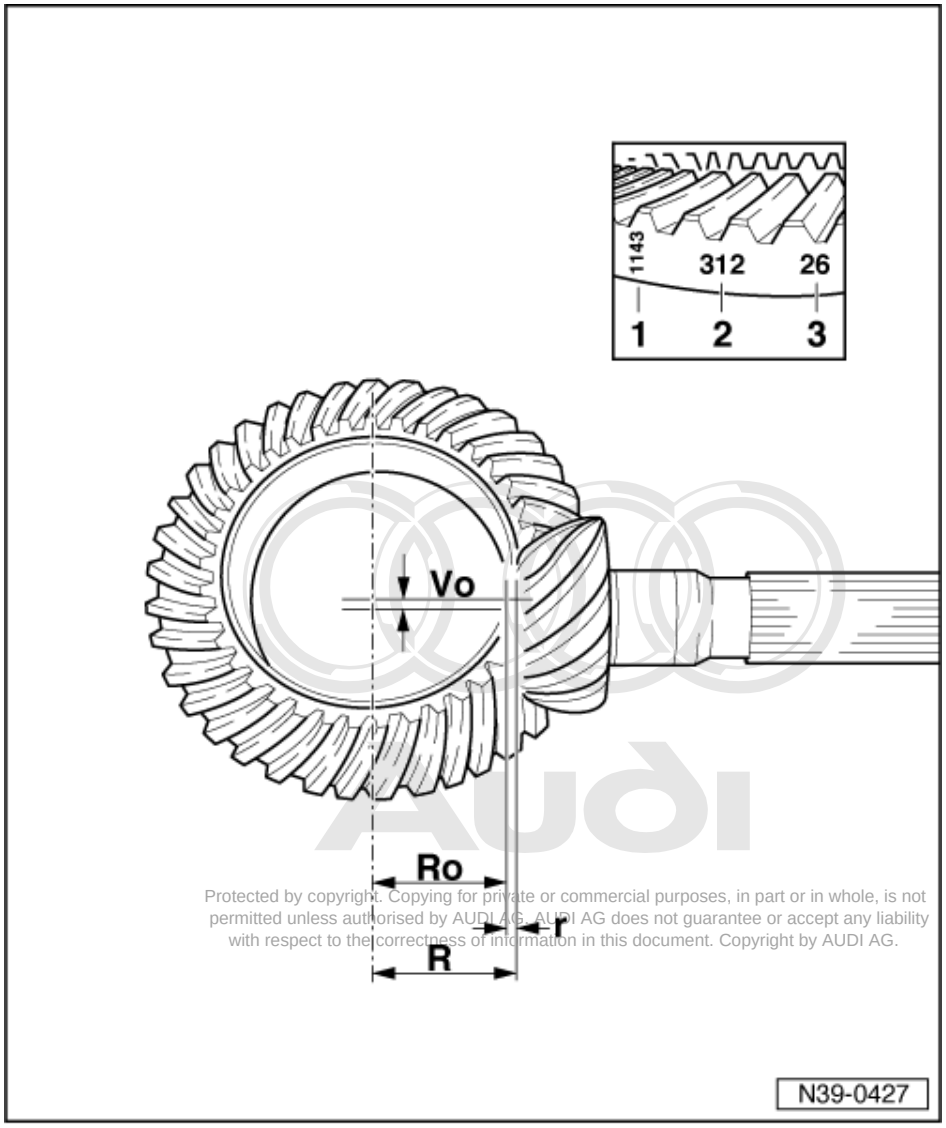
5.2 - Adjusting gear sets; identification markings



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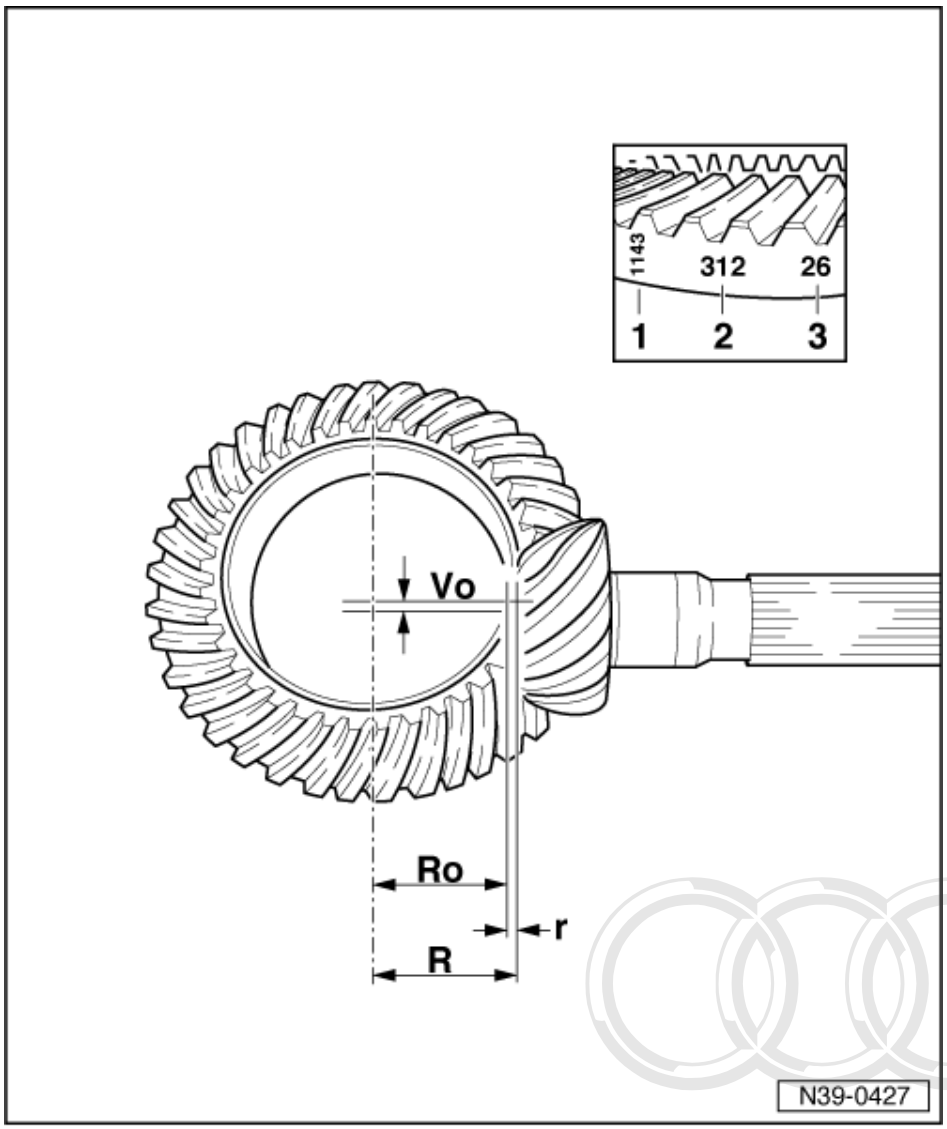
1 Identification "1143" signifies Oerlikon gear set with a ratio of 43 : 11.
2 Gear set pairing number (312).
3 Deviation (tolerance) "r" is based on the test machine master gauge used in the production. The deviation "r" is always given in 1/100 mm. Example: "26" signifies
r = 0.26 mm

Ro - Length of test machine master gauge used.
Ro -Crown wheel = 59.20 mm



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R - Actual dimension between crown wheel and face of drive pinion at point with quietest running for this gear set.

Vo - Hypoid offset

5.3 - Recommended sequence for readjusting final drive set

The following work sequence is recommended to save time when the drive pinion and crown wheel have to be adjusted:

1.) Determine total shim thickness "Stotal" for "S1" +"S2" (sets preload for taper roller bearings for differential) => from Page 209 .

2.) Determine total shim thickness "Stotal" for "S3" + "S4" (sets preload for taper roller bearings for drive pinion) => from Page 202 .

3.) Distribute total shim thickness "Stotal" for "S3" + "S4" so that the distance from centre of crown wheel to face of drive pinion is the same as distance "R" which was determined during production => from Page 207 .

4.) Distribute total shim thickness "Stotal" for "S1" + "S2" so that the specified backlash between crown wheel and drive pinion is maintained => from Page 213 .

Note:

Overview of components and shims=>Page 192

Special tools, testers and auxiliary items

- Lever VW 296
- Universal mandrel VW 385/1
- 2 centralising discs VW 385/2
- Measuring plunger VW 385/14
- Measuring gauge extension VW 385/16
- End dimension plate VW 385/17
- Master gauge VW 385/30
- End dimension plate VW 385/33
- Universal dial gauge bracket VW 387
- Measuring lever VW 388
- Press plate VW 402
- Press tool VW 407
- Press tool VW 412
- Press piece VW 433
- Press piece VW 454
- Tube 459/2
- Threaded spindle VW 517
- Crown wheel adjusting appliance VW 521/4
- Crown wheel adjusting appliance VW 521/8
- Press plate 30-205
- Support bridge 2011
- Tube 2040
- Puller 3046
- Press disc 3062
- Assembly sleeve 3187
- Torque wrench V.A.G 1601 (150...800 Nm)
- 41 mm AF socket insert
- Torque gauge (commercially available) 0 ... 600 Ncm
- Dial gauge
- Separating tool Kukko 17/2

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5.4 - Adjusting drive pinion

The table on Page 194 lists the repairs which require adjustment of the drive pinion.

The table also indicates whether the two shims "S3" and "S4" have to be measured, or only shim "S4".

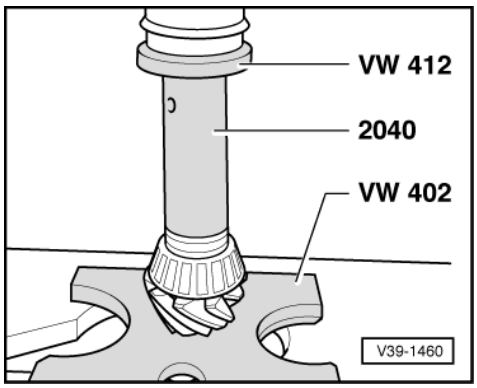
Notes:

- If the old bearings are to be re-installed after dismantling the drive pinion, measure the friction torque of the old bearings before dismantling => Page 205 .
- The same friction torque must then be obtained after re-assembly with the old bearings (a friction torque up to 80 Ncm higher is also permissible).

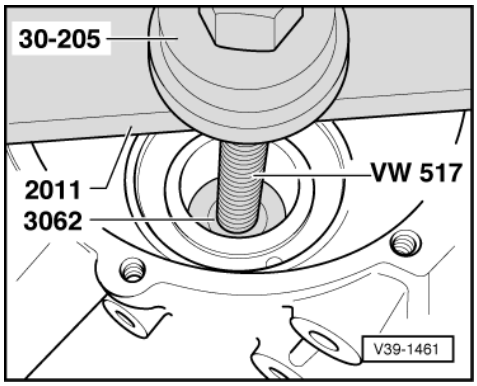
- If new bearings are installed, the friction torque does not have to measured before dismantling. In this case the friction torque must be as specified for new bearings => Page 205 .

Determining total shim thickness "Stotal" for shims "S3" + "S4"

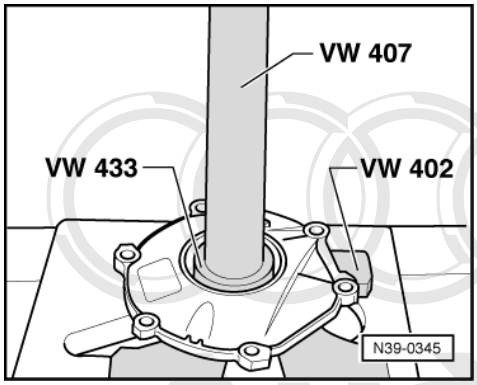
(Setting preload of taper roller bearings for drive pinion)



- -> Press on taper roller bearing inner race with bush for drive pinion.



- -> Pull taper roller bearing outer race with shim "S3" (1.50 mm thick) into gearbox housing.



- -> Press taper roller bearing outer race into cover for drive pinion.

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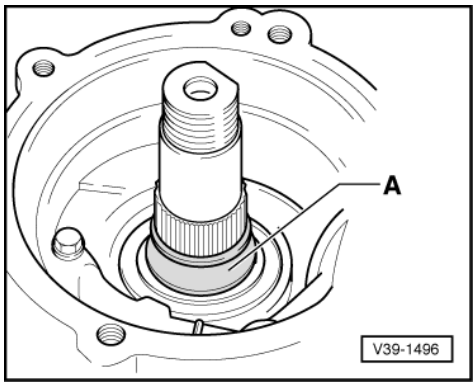
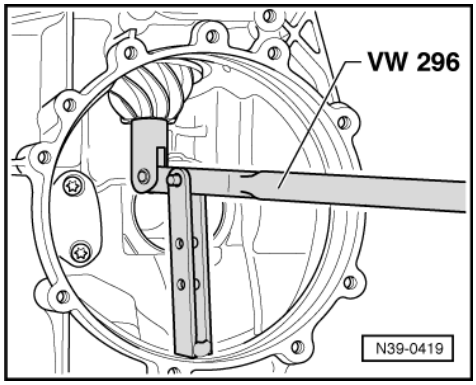


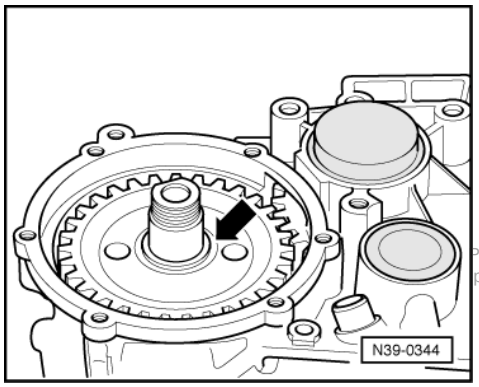
- -> Insert drive pinion in gearbox housing.

A - Assembly sleeve 3187

Use assembly sleeve 3187 when inserting drive pinion to avoid damaging the sealing lips.



- -> Press drive pinion against taper roller bearing outer race (in gearbox housing) using press lever VW 296 and hold in this position.



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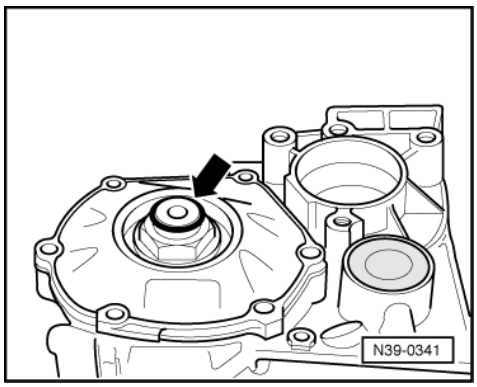
- -> Assemble parking lock gear, output gear and 2.40 mm thick "S4" shim -arrow- (use 2 shims, each 1.20 mm thick).
- Slide on spacer tube.

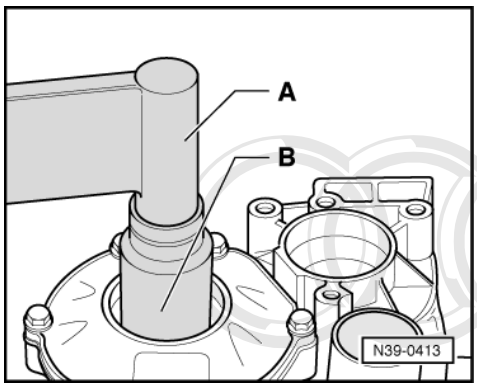
Note:

Installation position of parking lock gear, output gear and spacer tube=>from Page 171 .

- Fit cover for drive pinion.



- -> Insert taper roller bearing inner race and screw hexagon nut -arrow- onto drive pinion.
- Tighten the four bolts for drive pinion cover to 25 Nm.
- Engage parking lock.



- -> Preload hexagon nut to 340 Nm.

A - Torque wrench V.A.G 1601
B - Socket attachment, 41 mm A/F

- Loosen hexagon nut and tighten to 240 Nm.

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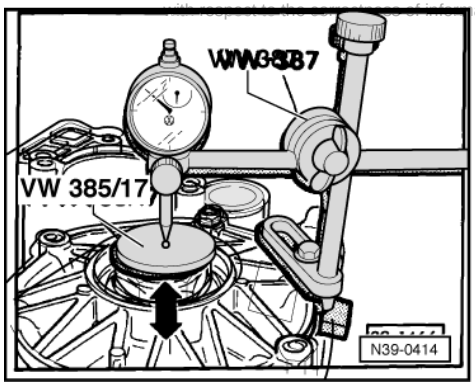


- -> Secure dial gauge bracket VW 387 to cover for drive pinion, place end measuring plate VW 385/17 onto drive pinion.
- Mount dial gauge and set to "0" with 1 mm preload.
- Move drive pinion up and down several times without turning.

Note:

If the drive pinion is turned the reading will be false.

- Read off axial play on dial gauge and note.

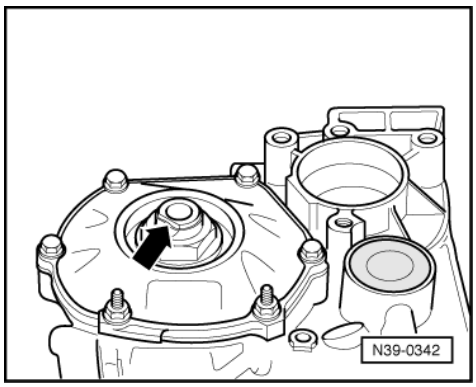
- Measurement in following example: 0.95 mm.

- Subtract dial gauge measurement, bearing preload and settling allowance from thickness of inserted shim "S4".

Example:

Inserted shim "S4"	2.40 mm
- Measurement	0.95 mm
- Bearing preload and settling allowance	0.25 mm
= Thickness of "S4" shim to be inserted	1.20 mm

- Remove cover for drive pinion, spacer tube and 2.40 mm shim.
- Install shim with the thickness calculated (1.20 mm in example). Table of shims for "S4" => Page 208 .



- -> Install cover for drive pinion. Preload hexagon nut to 340 Nm, then loosen nut and tighten again to 240 Nm. Secure by peening with punch -arrow-.

-> Measuring friction torque (checking setting)

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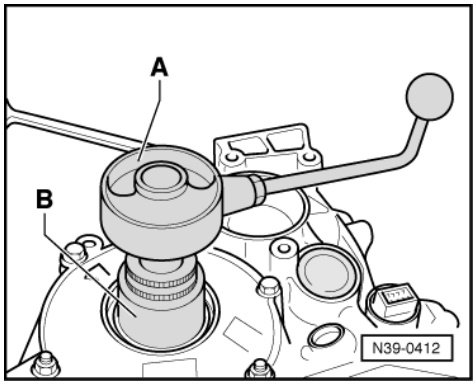
Notes:

- The output gear must be removed if the friction torque of the drive pinion is to be measured with the planetary gearbox and input gear installed.
- In the place of the output gear, fit a bush pressed out of a defective output gear. Measure thickness of bush, and use shims "S4" to compensate for any difference in thickness between the bush and the previously removed output gear=>table on Page 208 .

- Input gear and differential removed.

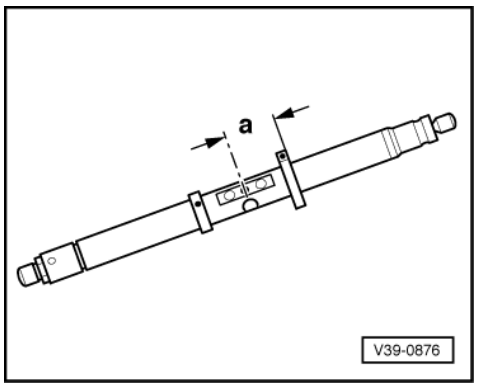


- -> Fit 41 mm A/F socket attachment -A- and torque gauge 0 ... 600 Ncm -B- to drive pinion nut.
- Read off friction torque. The friction torque should be between80 and 220 Ncm with new taper roller bearings.

Note:

If the old bearings have been re-installed, the friction torque should now be the same as the total friction torque measured before dismantling. (A friction torque up to 80 Ncm higher is also permissible).

Determining measurement "e"



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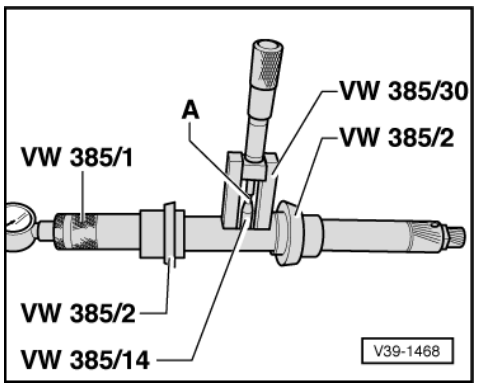
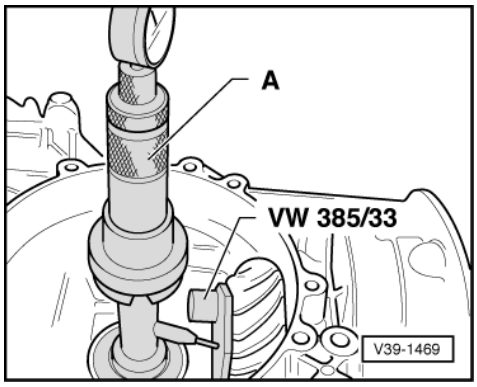
Note:

Measurement "e" is required to determine the final shim thickness of "S3" and "S4".

- -> Adjust setting ring of universal mandrel VW 385/1 to the following setting:
  - Distance a = 70 mm



- -> Assemble universal mandrel VW 385/1 as illustrated:
  - Dial gauge extension -A-, 12 mm long
  - Master gauge VW 385/30
- Set master gauge VW 385/30 to Ro = 59.2 mm (for crown wheel) and fit on universal mandrel.
- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.

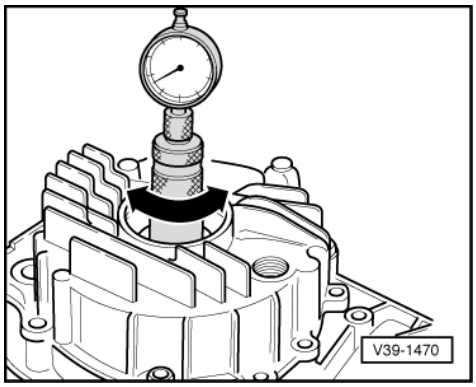


- -> Place end measuring plate on face of drive pinion.

Note:

Ensure plate contact surface fits exactly and is free of oil.

- Insert universal mandrel -A-.
- Fit cover for differentialand tighten the 4 bolts.
- Usesliding setting ring to pull 2nd centring disc outwards until mandrel can still just be turned by hand.



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- -> Turn mandrel until the dial gauge plunger tip touches the end measuring plate on drive pinion head, then measure maximum deflection (return point).

• In following example, reading "e" = 0.32 mm (red scale).

Note:

Then, (after removing universal mandrel) check again that the dial gauge, with master gauge VW 385/30 in place, indicates "0" with 2 mm preload, otherwise correct adjustments.

Determining thickness of shim "S3"

Example:

- Add measurement "e" to thickness of inserted shim, then subtract deviation "r" (marked on crown wheel).

Notes:

- The deviation "r" related to the master gauge "Ro" is measured for the final drive sets supplied as replacement parts and marked on the outer circumference of the crown wheel.
- If dial gauge reading is in red scale, dimension "e" must be added.
- If dial gauge reading is in black scale, dimension "e" must be subtracted.

Inserted shim "S3"	1.50 mm
+ Measurement "e"	0.32 mm
- Deviation "r"	0.26 mm
= Thickness of shim "S3"	1.56 mm

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

Determining thickness of shim "S4"

- Add measurement "e" to thickness of inserted shim "S4", then subtract deviation "r".

Example:

Inserted shim "S4"	1.20 mm

+ Measurement "e"	0.32 mm
- Deviation "r"	0.26 mm
= Thickness of shim "S4"	1.26 mm

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

Notes:

- If a thicker "S3" shim is required, also install a thicker "S4" shim (add the same amount).
- If a thinner "S3"shim is required, also install a thinner "S4" shim (subtract the same amount).

Table of shims for "S3"

Thickness of shims in mm			
1.05	1.30	1.55	1.80
1.10	1.35	1.60	1.85
1.15	1.40	1.65	
1.20	1.45	1.70	
1.25	1.50	1.75	

Table of shims for "S4"

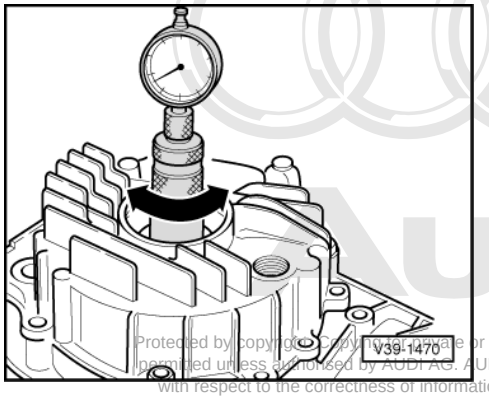
Thickness of shims 1) in mm				
1.000	1.225	1.450	1.675	1.900
1.025	1.250	1.475	1.700	1.925
1.050	1.275	1.500	1.725	1.950
1.075	1.300	1.525	1.750	1.975
1.100	1.325	1.550	1.775	2.000
1.125	1.350	1.575	1.800	2.400
1.150	1.375	1.600	1.825	
1.175	1.400	1.625	1.850	
1.200	1.425	1.650	1.875	

1) Shim tolerance variations make it possible to find the exact thickness required for the "S4" shim; use 2 shims if necessary.

Performing check measurement

Checking dimension "r"

- Install drive pinion with shims "S3" and "S4" which have been measured.



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- -> Insert universal mandrel, => "Determining measurement 'e'" on Page 206 and perform check measurement.
- Turn differential 5 turns in both directions so that the taper roller bearings settle.
- Read off dial gauge anti-clockwise (red scale).
  - If the shims have been correctly selected, the deviation "r" (marked on outer circumference of crown wheel) must be shown - within a tolerance of ± 0.04 mm

Note:

Then, (after removing universal mandrel) check again that the dial gauge, with master gauge VW 385/30 in place, indicates "0" with 2 mm preload, otherwise correct adjustments.

5.5 - Adjusting crown wheel

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(Adjusting differential)

The table on Page 194 lists the repairs which require adjustment of the crown wheel.

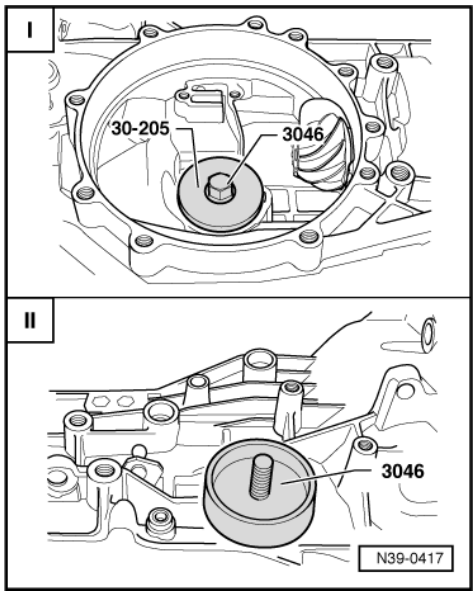
Notes:

- If the old bearings are to be re-installed after dismantling the differential, measure the friction torque of the old bearings before dismantling=>Page 211 .
- The same friction torque must then be obtained after re-assembly with the old bearings (a friction torque up to 80 Ncm higher is also permissible).
- If new bearings are being installed, the friction torque does not have to be measured before dismantling. In this case the friction torque must be as specified for new bearings=>Page 211 .

Determining total shim thickness "Stotal" for shims "S1" + "S2"

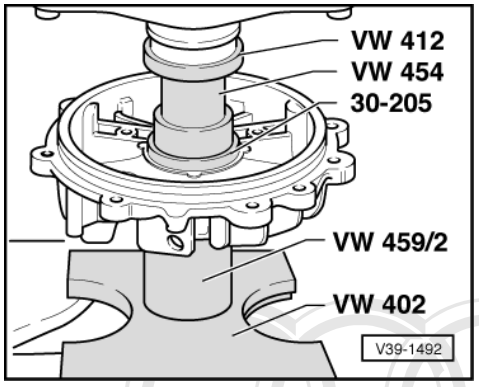
(Setting preload of taper roller bearings for differential)

- Drive pinion removed
- Grooved ball bearing, tapered ring and spring are removed=>from Page 181 .

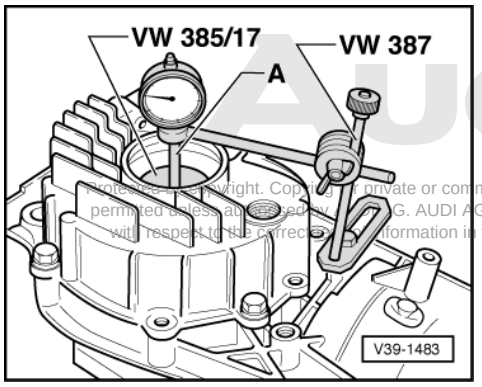


- Remove oil seal, drive gear for speedometer sender -G22 and outer races of both taper roller bearings for differential.
- Take out shims=>Page 184 .

- -> Drive taper roller bearing outer race into gearbox housing with shim "S2". For measuring, use a 1.50 mm thick shim "S2" (2 shims with a thickness of 0.75 mm).



- -> Press taper roller bearing outer race without shim "S1" into cover for differential.
- Fit differential into gearbox housing.
- Fit cover and tighten bolts to 25 Nm.



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- -> Secure dial gauge bracket VW 387 to housing and place end measuring plate VW 385/17 on differential.
- Preload dial gauge to 1 mm and set to zero.
- Move differential up and down several times without turning it.

Note:

If the differential is turned, this will give an incorrect measurement.

- Read off axial play on dial gauge and note reading.

• Reading in following example: 0.60 mm.

Formula:
"Stotal" = "S2*" + measurement + bearing preload

Example:		
	Inserted shim(s) "S2*"	1.50 mm
+	Measurement	0.60 mm
+	Bearing preload (constant)	0.40 mm
=	Total thickness "Stotal" for shims "S1" + "S2"	2.50 mm

Determining thickness of shim "S1*"

Notes:

- The preliminary adjustment shim "S1*" will be replaced with the final shim "S1" after determining the backlash.
- The total shim thickness "Stotal" remains unchanged.

Formula:		
"S1*"	=	"Stotal" - "S2*"

Example:		
	Total thickness "Stotal" for shims "S1" + "S2"	2.50 mm
-	Inserted shims(s) "S2*"	1.50 mm
=	Thickness of shim "S1*"	1.00 mm

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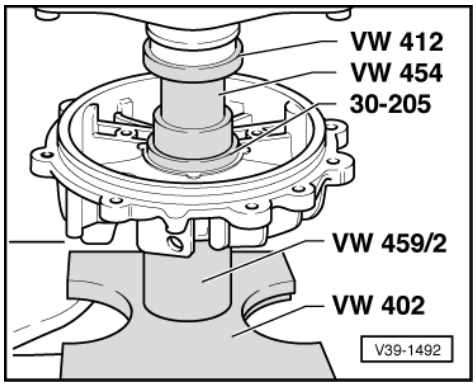
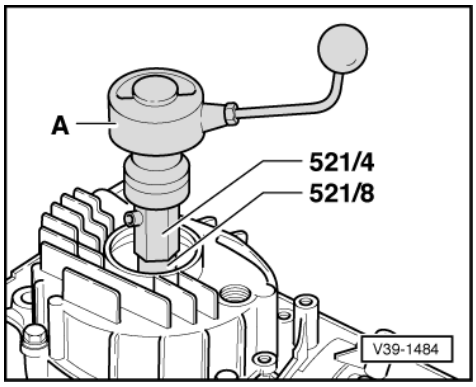


- -> Press shim "S1" with correct thickness (1.00 mm in example) and outer race for taper roller bearing into cover for differential.
- Fit cover and tighten bolts to 25 Nm.

Measuring friction torque (checking setting)

- Drive pinion removed
- Differential fitted with shims "S1*" and "S2*"



- -> Fit torque gauge 0 ... 600 Ncm -A- onto differential.
- Read off friction torque. Specified value for new taper roller bearings: 70 ... 150 Ncm.

Notes:

- If the old bearings have been re-installed, the friction torque should now be the same as the total friction torque measured before dismantling. (A friction torque up to 80 Ncm higher is also permissible).

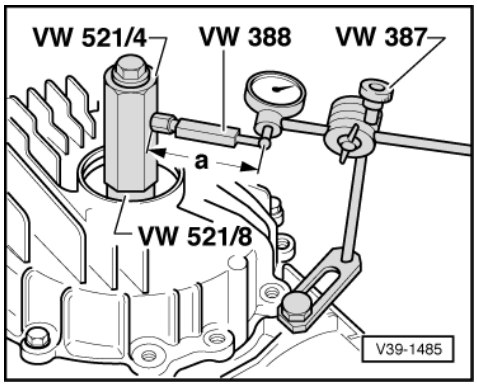
- If the final drive gear set is being re-adjusted, now perform adjustment of drive pinion and check the setting as described => Page 201 .

5.6 - Adjusting backlash

(Setting position of crown wheel in gearbox housing)

- Drive pinion and shims "S3" and "S4" installed

- Install differential.
- Fit cover fordifferential and tighten bolts to 25 Nm.
- Turn differential several times in both directions so that the taper roller bearings settle.

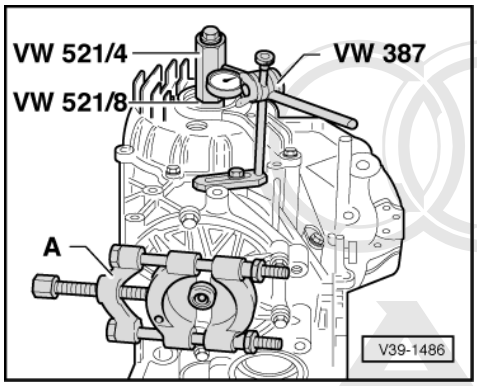


- -> Secure dial gauge retainer VW 387 onto housing.
- Attach crown wheel adjusting device VW 521/4 and VW 521/8.
- Set measuring lever VW 388 to dimension "a" = 70 mm.

Measure play between teeth flanks (backlash) as follows:

- Turn crown wheel until it makes contact with one tooth flank (end of backlash travel).
- Preload dial gauge to 1 mm and set to zero.

- Turn crown wheel back until it makes contact with the opposite tooth flank.
- Read off backlash and note reading.



- -> If the drive pinion also turns when taking the measurement, attach separating device -A- (e.g. Kukko 17/2) to lock drive pinion.
- Turn crown wheel through 90° and repeat measurements a further 3 times.

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Note:

Loosen clamping device before rotating crown wheel.

Determining average backlash

- Add the four measured values together and divide by four.

Example:		
	1st measurement	0.49 mm
+	2nd measurement	0.48 mm
+	3rd measurement	0.50 mm
+	4th measurement	0.49 mm
=	Sum of measured values	1.96 mm

- Result: the average backlash is 1.96 mm /4 = 0.49 mm.

Note:

If the individual measurements differ by more than 0.06 mm from each other, the installation of the crown wheel or the final drive set itself is not correct. Check installation, replace final drive set if necessary.

Determining thickness of shim"S2"

- Multiply the backlash figure by 1.17 (constant value), subtract the result from the thickness of the already inserted shim "S2" (1.50 mm in example), and add 0.20 mm for lift (constant value).

Example:		
	Inserted shim "S2*"	1.50 mm
-	Average backlash (0.49 mm) x 1.17	0.57 mm
+	Lift (constant)	0.20 mm
=	Thickness of shim "S2"	1.13 mm

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

The following shims are available for "S2"

Shim thickness (mm) 1)		
0.55	0.75	0.95
0.60	0.80	1.00
0.65	0.85	1.05
0.70	0.90	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.

Determining thickness of shim "S1"

Formula:
"S1" = "Stotal" - "S2"

Example:		
	Total thickness "Stotal" for "S1" + "S2"	2.50 mm
-	Thickness of shim "S2"	1.13 mm
=	Thickness of shim "S1"	1.37 mm

- Determine shim(s) as accurately as possible from table. Part numbers

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=> Parts catalogue

The following shims are available for "S1"

Shim thickness (mm) 1)		
0.55	0.75	0.95
0.60	0.80	1.00
0.65	0.85	1.05
0.70	0.90	

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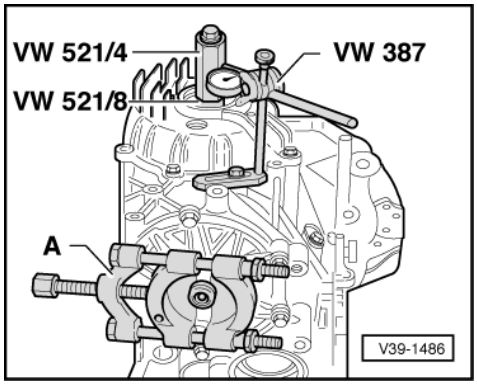
1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.



-> Performing check measurement

- After installing shims "S1" and "S2", turn differential 5 turns in both directions so that the taper roller bearings settle.
- Measure backlash four times on circumference.
  - Specification: 0.15 ... 0.25 mm